

DAIHATSU

L500, L501

LUBRICATION SYSTEM

LU

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NOTE:
The contents described in the service manual have been explained in the EM section. Please refer to the EM section, as required.

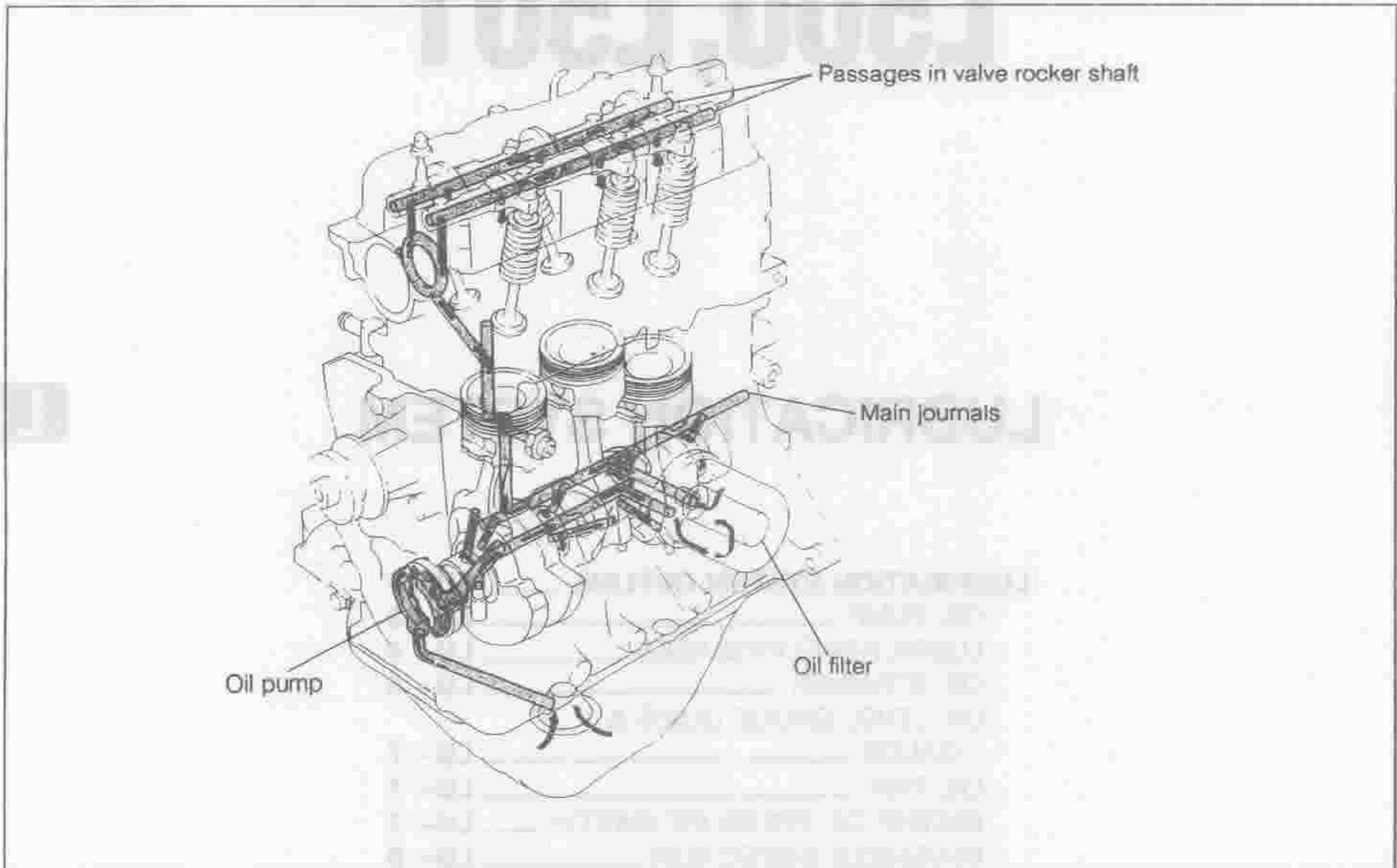
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NO. 9198-LE

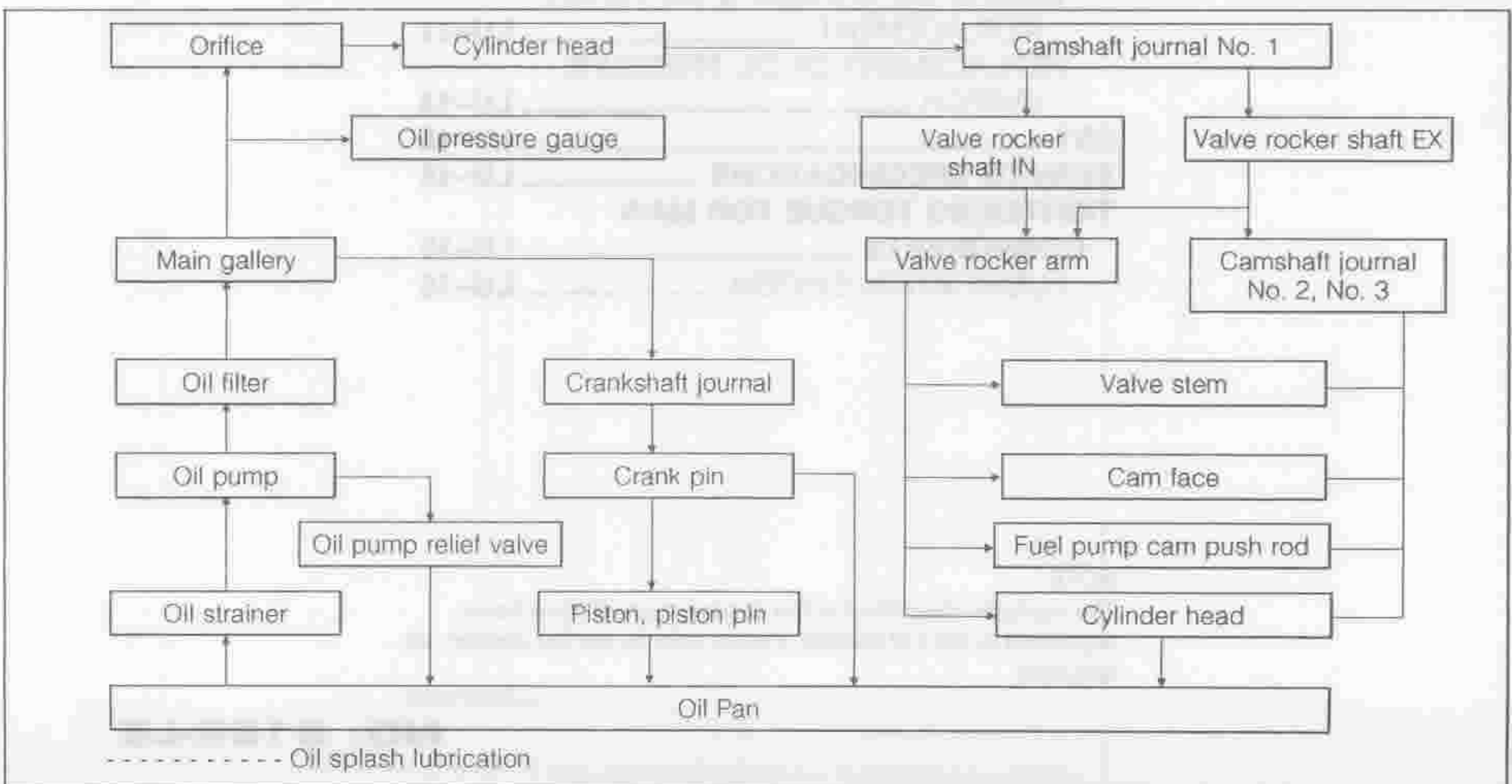
LUBRICATION SYSTEM OUTLINE

The lubrication system employs a full-forced feed, filtering method.

The oil in the oil pan is sucked with an oil pump directly driven by the crankshaft and filtered at an oil filter. The oil passes through each passage inside the cylinder block. In this way, one stream of oil lubricates the crankshaft components and piston-related parts, while the other stream of oil lubricates the camshaft and valve rocker shaft-related parts.



LUU00002-00001



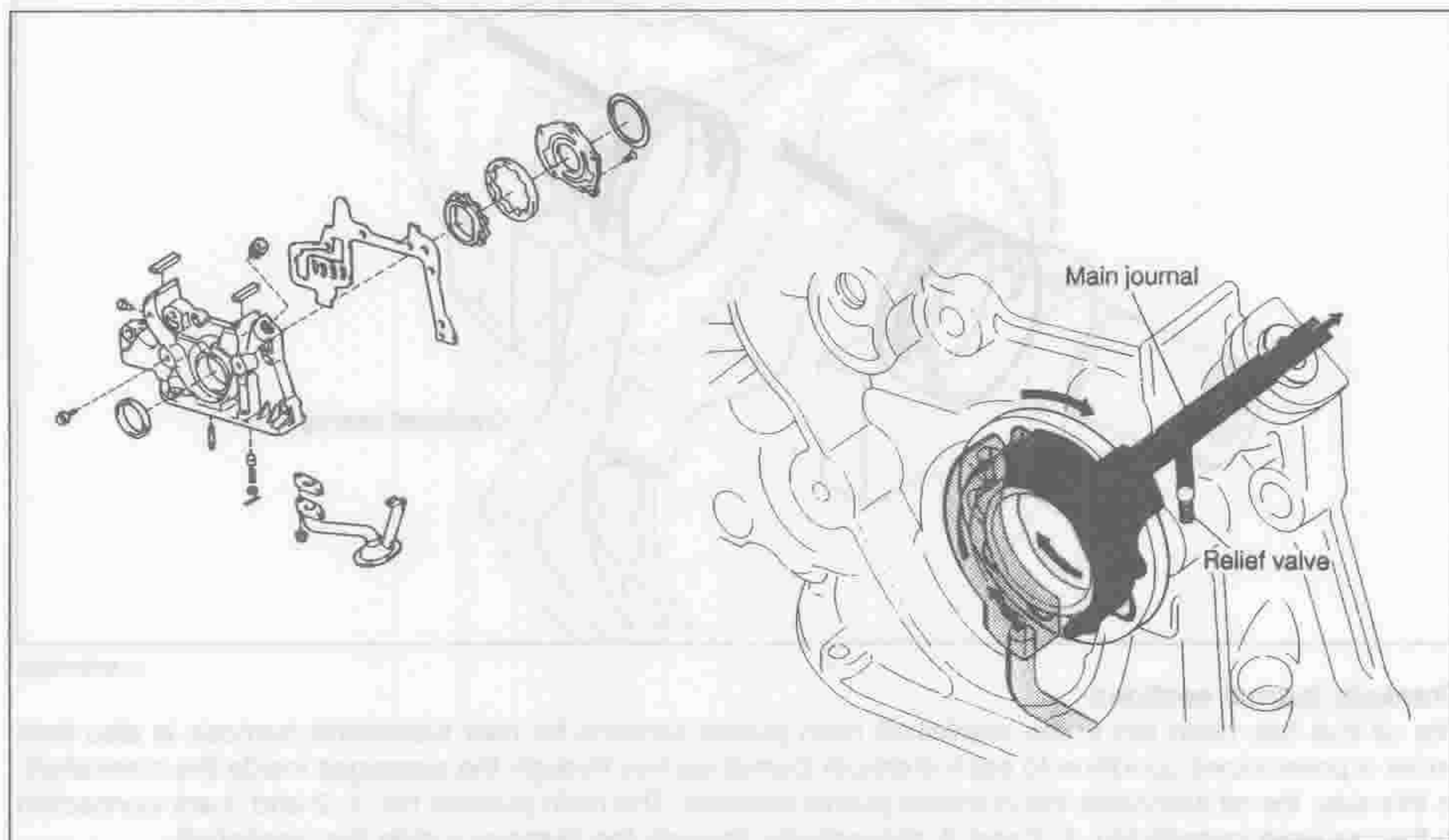
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OIL PUMP

The oil pump has been made integral with the front oil seal retainer, and a direct driving method by the crankshaft has been employed.

The oil pump is of a multi-lobe trochoid type, in which the relief valve has been provided at the pump body. In addition, the oil pump body has been provided with an oil separator for blow-by gas and the oil level gauge guide.

The pitches between the holes of the oil pan attaching bolts have been changed. Also, the number of the bolt holes has been increased.



LLU00004-00002

Oil pump specifications

Type	Multi-lobe trochoid type
Number of drive gear teeth	9
Number of driven gear teeth	10

Oil pump performance

Pump revolution speed	Delivery output	Delivery pressure
1,000 rpm	3.8 dm ³ /min	147 kPa (1.5 kgf/cm ²)
4,000 rpm	16 dm ³ /min	343 kPa (3.5 kgf/cm ²)
Relief valve opening pressure		470.7 - 549.2 kPa (4.8 - 5.6 kgf/cm ²)

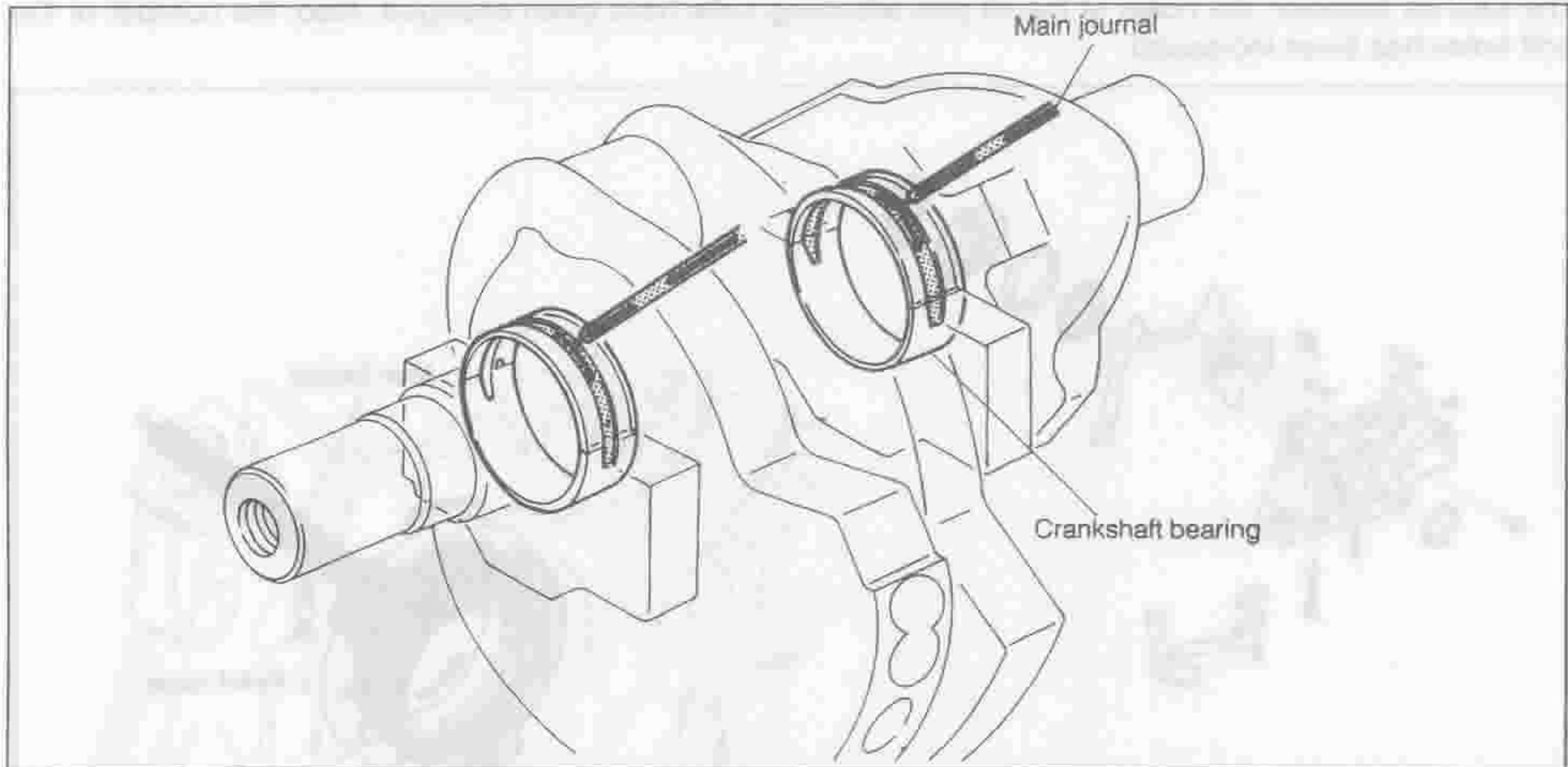
Oil temperature: 60°C

LLU00005-00000

LUBRICATING PASSAGES

Crankshaft main journal sections

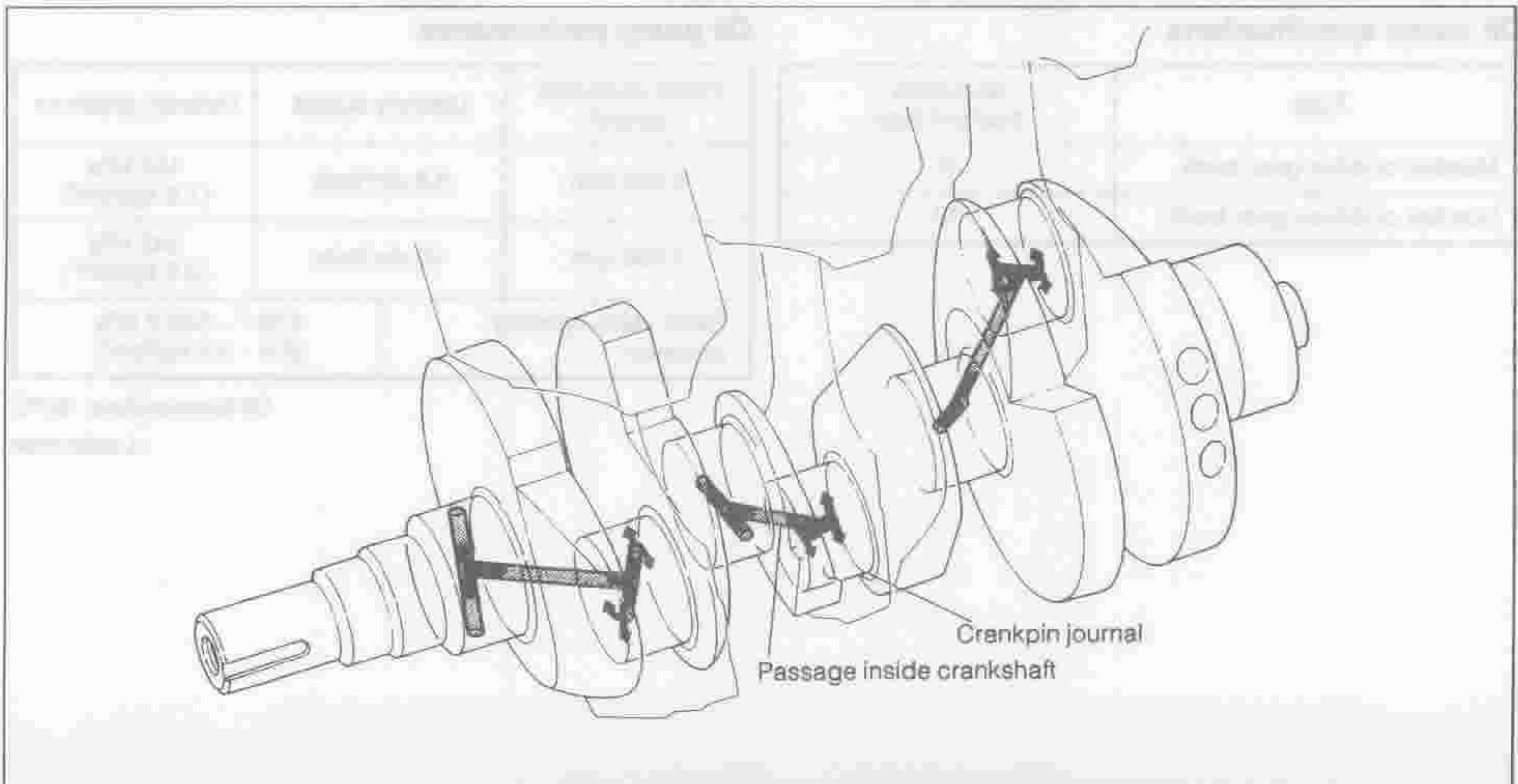
The oil is fed from the main journals through the passages inside the cylinder block under a pressurized condition. Then, it is supplied from the oil hole of the crankshaft bearing to each crankshaft main journal section. Thus, the groove inside each bearing is filled with the supplied oil. Consequently, the oil lubricates the crankshaft main journal sections.



LLU00006-00003

Crankpin journal sections

The oil that has been fed to the crankshaft main journal sections for their lubrication purpose is also sent under a pressurized condition to each crankpin journal section through the passages inside the crankshaft. In this way, the oil lubricates the crankpin journal sections. The main journals No. 1, 2 and 3 are connected to the crankpin journals No. 1, 2 and 3, respectively, through the passage inside the crankshaft.

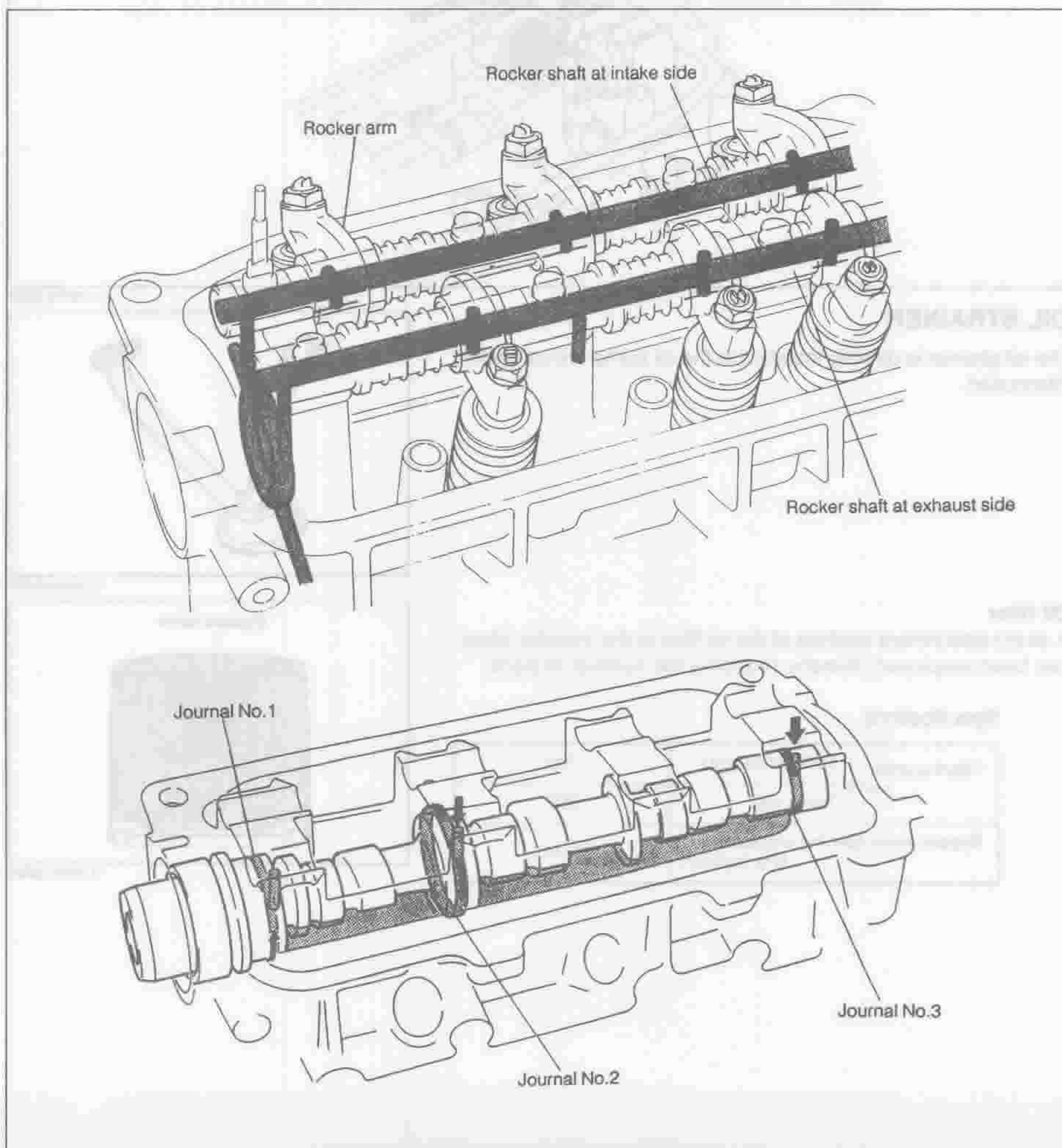


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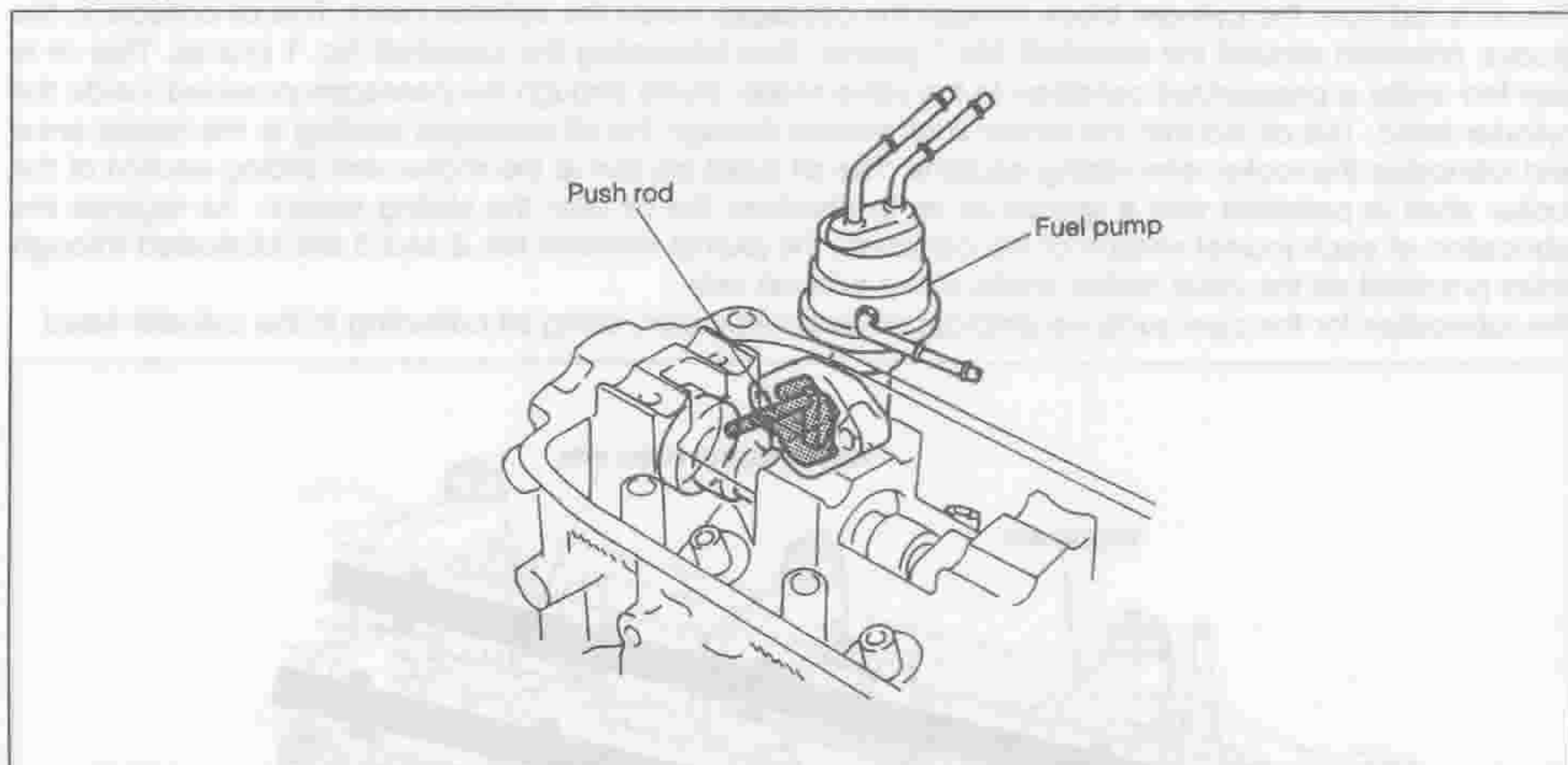
Cylinder head section

The oil is fed from the cylinder block through the passages inside the cylinder head. This oil collects in the groove provided around the camshaft No. 1 journal, thus lubricating the camshaft No. 1 journal. This oil is also fed under a pressurized condition to the valve rocker shafts through the passages provided inside the cylinder head. The oil fed into the rocker shaft passes through the oil passages leading to the rocker arms and lubricates the rocker arm sliding sections. The oil outlet section at the rocker arm sliding section of the rocker shaft is provided with a groove so as to distribute the oil over the sliding section. As regards the lubrication of each journal section of the camshaft, the journal sections No. 2 and 3 are lubricated through holes provided on the valve rocker shafts at the exhaust side.

The lubrication for the cam surfaces employs oil-bath lubrication, using oil collecting in the cylinder head.



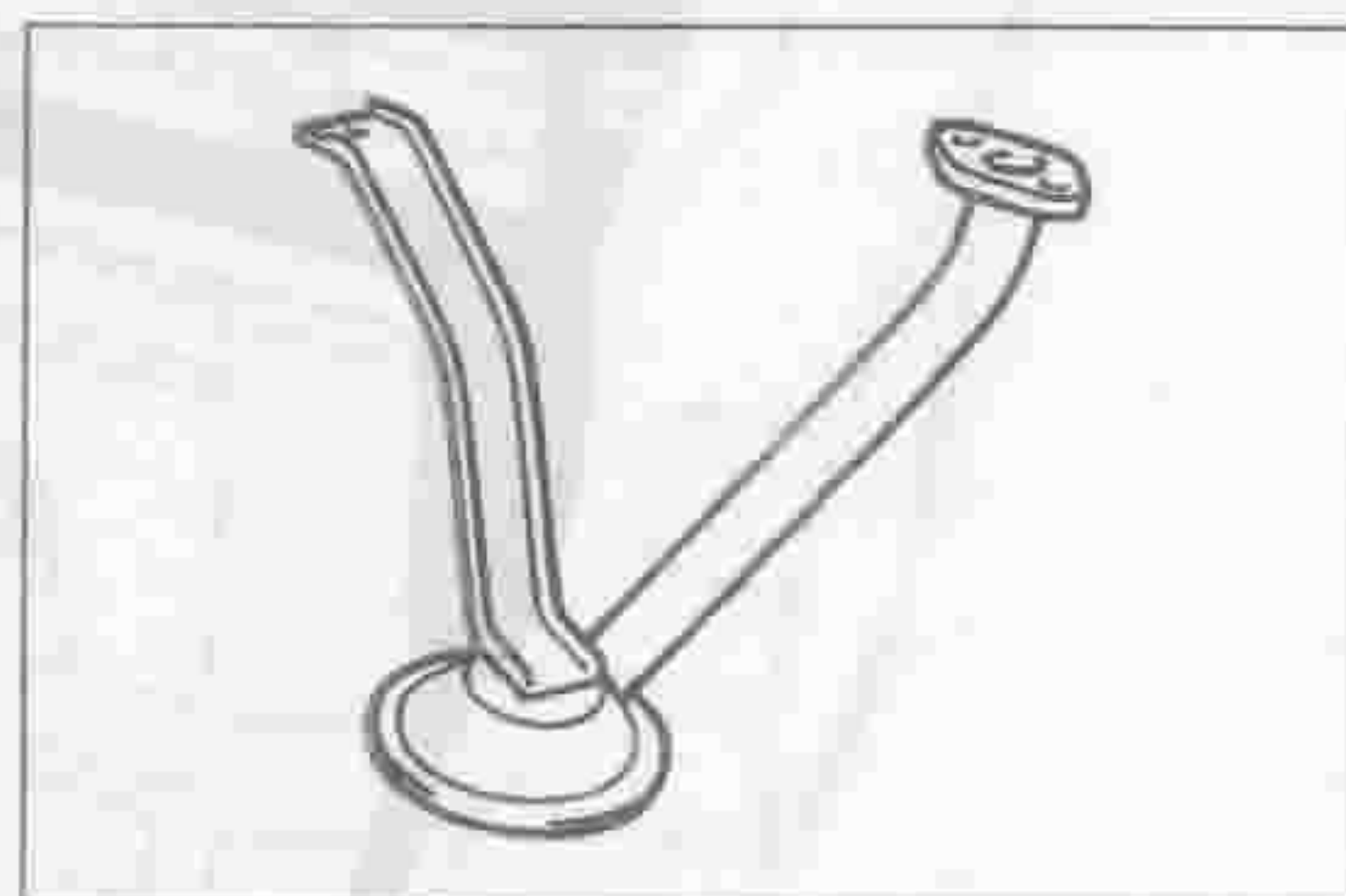
Fuel pump section



LLU00009-00006

OIL STRAINER

The oil strainer is directly installed to the oil pump with a gasket interposed.



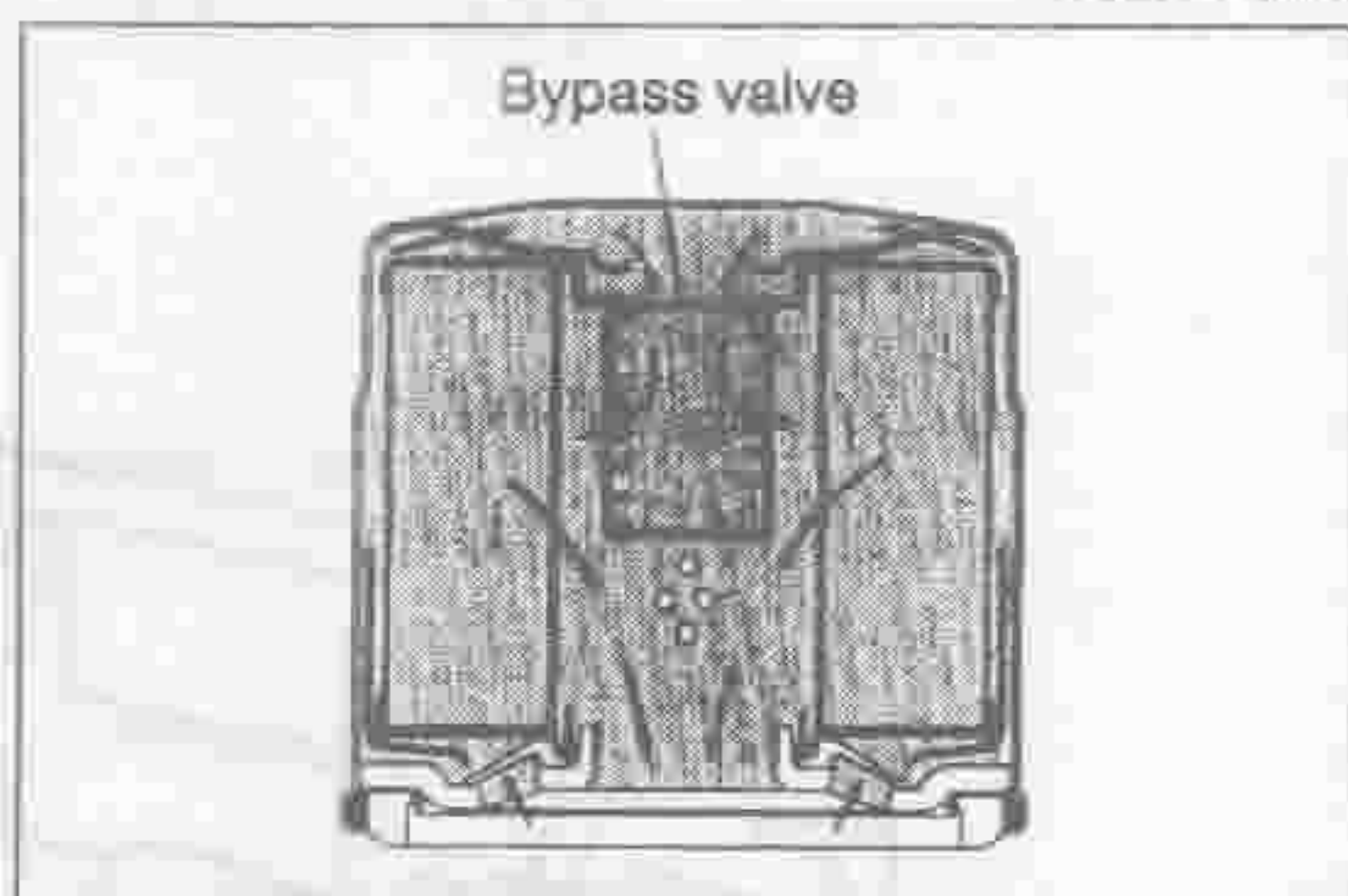
LLU00010-00007

Oil filter

A direct attachment method of the oil filter to the cylinder block has been employed, thereby reducing the number of parts.

Specifications

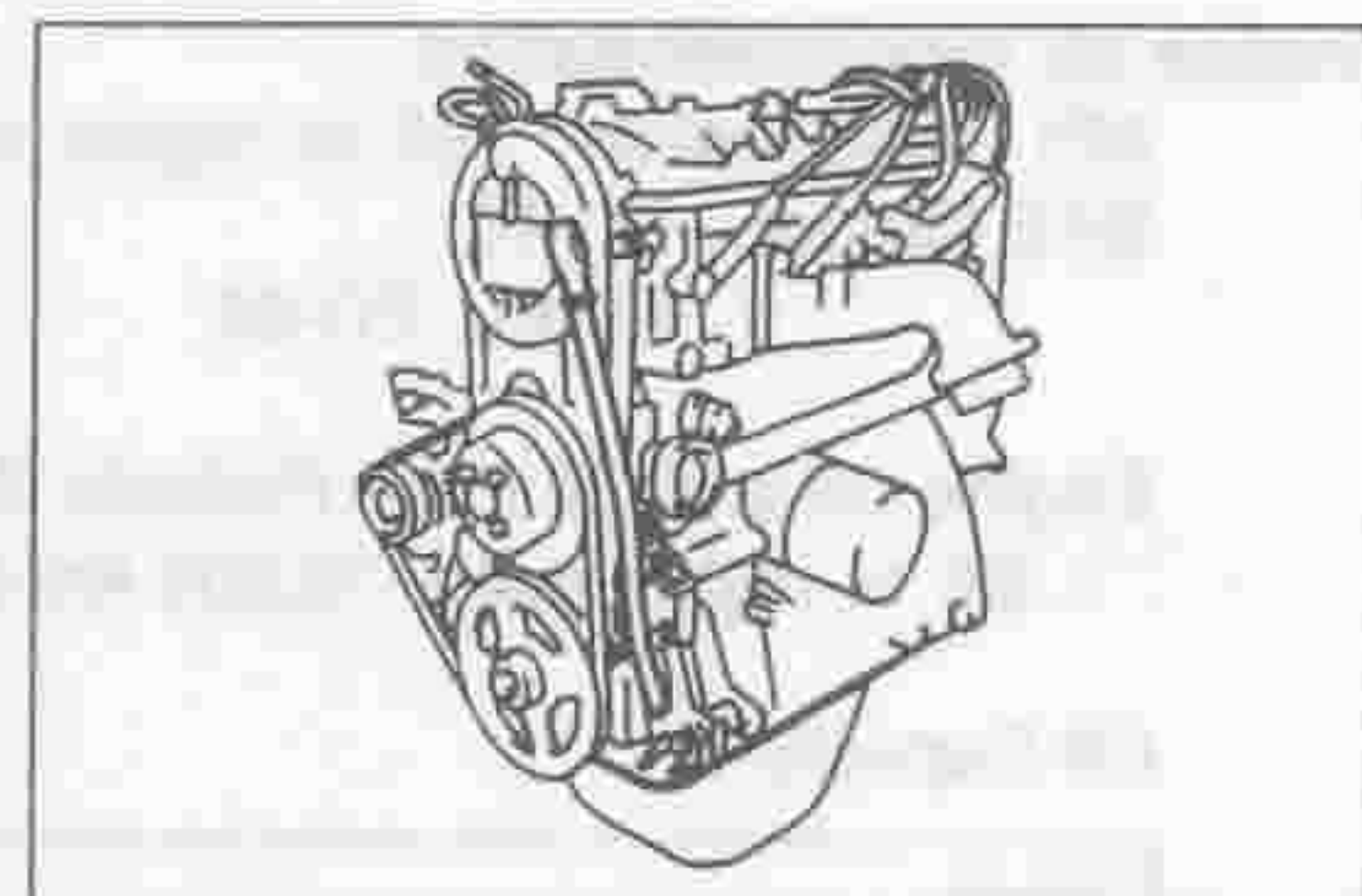
Filtering area cm ²	NIPPON DENSO	700
	Tokyo roki	800
Bypass valve opening pressure kPa (kgf/cm ²)		98 (1.0)



LLU00011-00008

OIL LEVEL GAUGE GUIDE & GAUGE

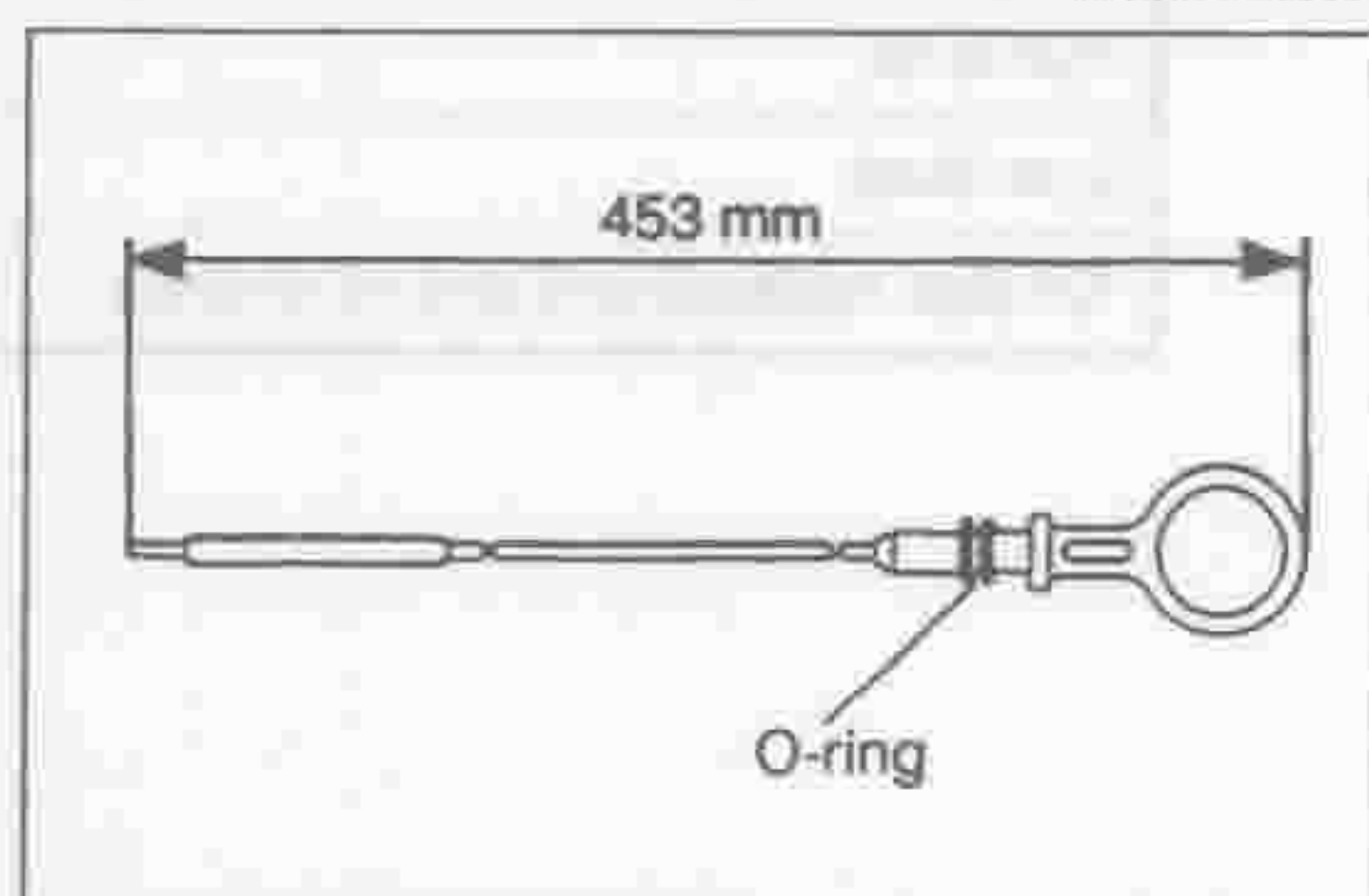
For easier use, the oil level gauge guide has employed a three-dimensional bending shape.



LLU00012-00009

The oil level gauge has been changed to a rod type which can easily follow the oil level gauge guide of the three-dimensional bending shape. For improved conspicuousness, the knob section of the oil level gauge has been painted yellow.

For enhanced resistance against oil leakage and gas leakage, the oil sealing has employed the O-ring.

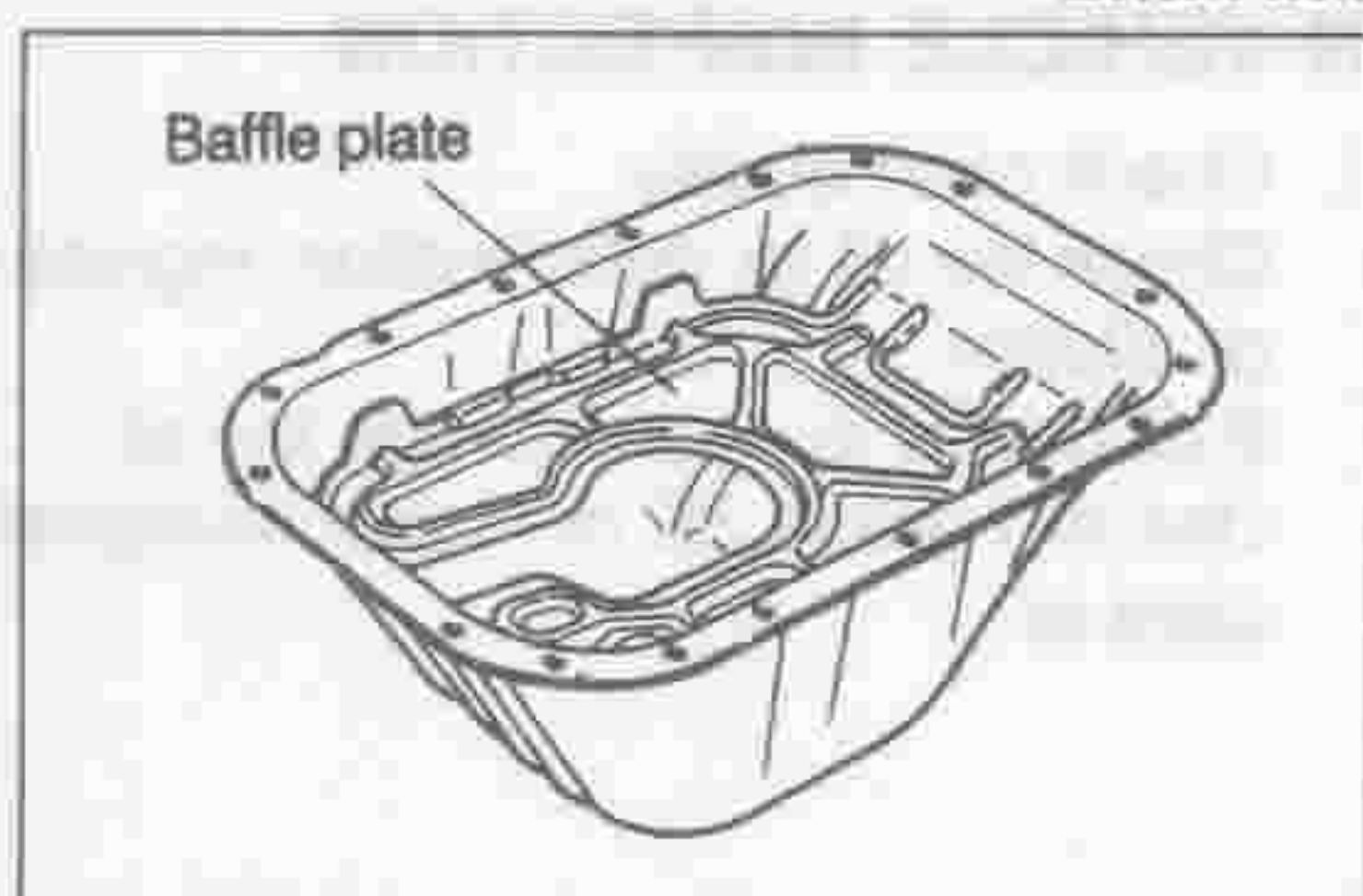


LLU00013-00010

OIL PAN

The oil pan is made of pressed steel sheet. A baffle plate is installed to the oil pan and the sheet thickness has been increased, compared with the hitherto-employed oil pan. Consequently, the rigidity has been increased and noise level from the oil pan has been reduced.

For improved sealing, the pitch of the oil pan attaching bolts has been changed so as to reduce deformation which may take place when the oil pan attaching bolts are tightened. As a result, a better sealing has been achieved. The gasket employs a liquid gasket which features superior sealing.



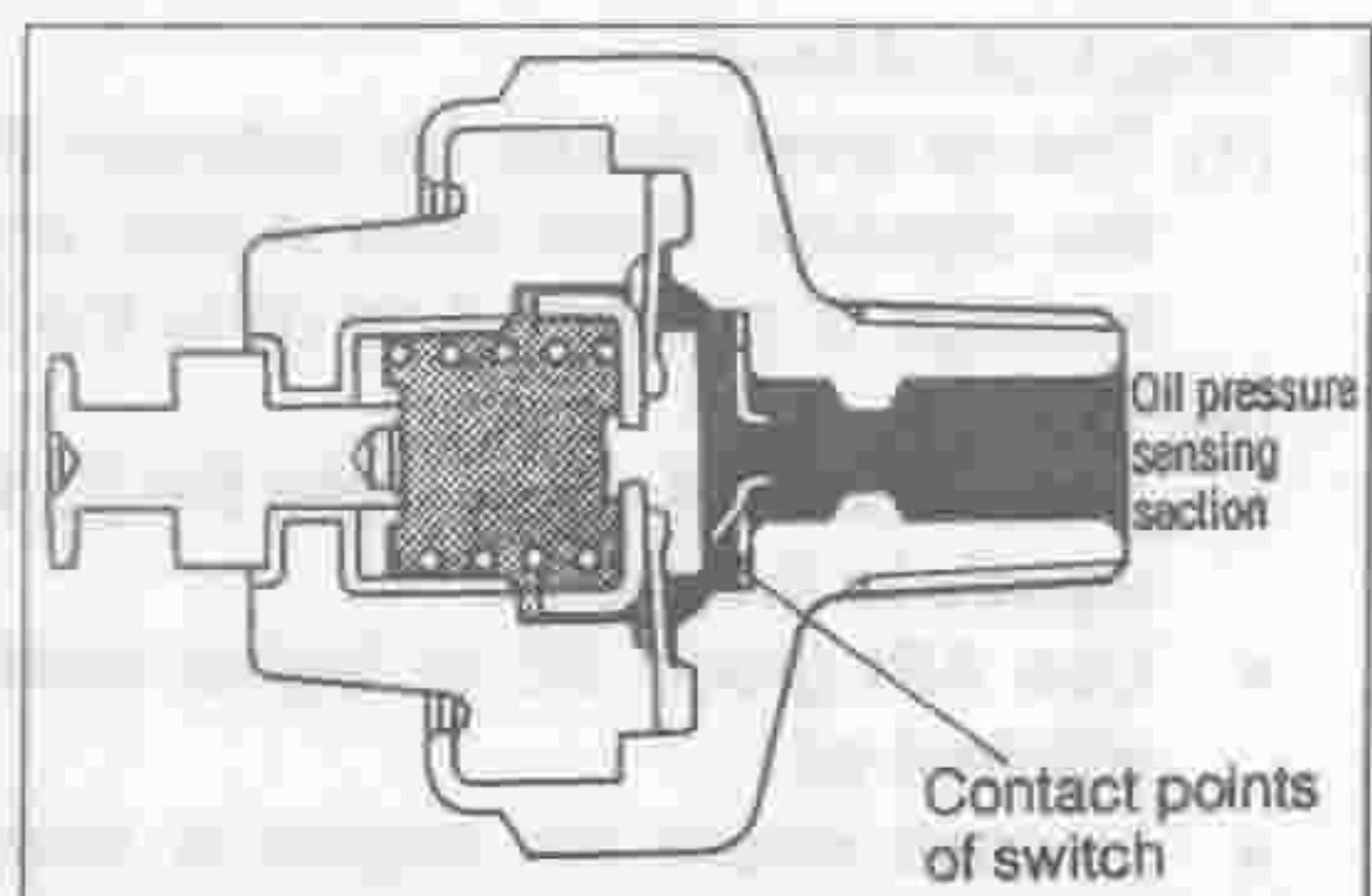
LLU00014-00011

ENGINE OIL PRESSURE SWITCH

The engine oil pressure switch is installed to the main gallery section of the cylinder block.

Oil Pressure Switch Specifications

Operating pressure	kPa (kgf/cm ²)	29.4 (0.3)
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LLU00015-00012

Engine oil recommendation

API Classification: SE or higher, fuel-efficient oil
 SAE Grade: ED-10 10W-30
 EF-EL, ED-20 5W-30

Engine Oil and Oil Filter Periodic Replacement Intervals:

SE or higher every 10,000 km or six months, whichever comes first

Oil Capacity

Unit: dm³

Whole	2.6
Full level	2.2
Low level	1.4
Oil filter replacement and oil change	2.3

LLU00016-00000

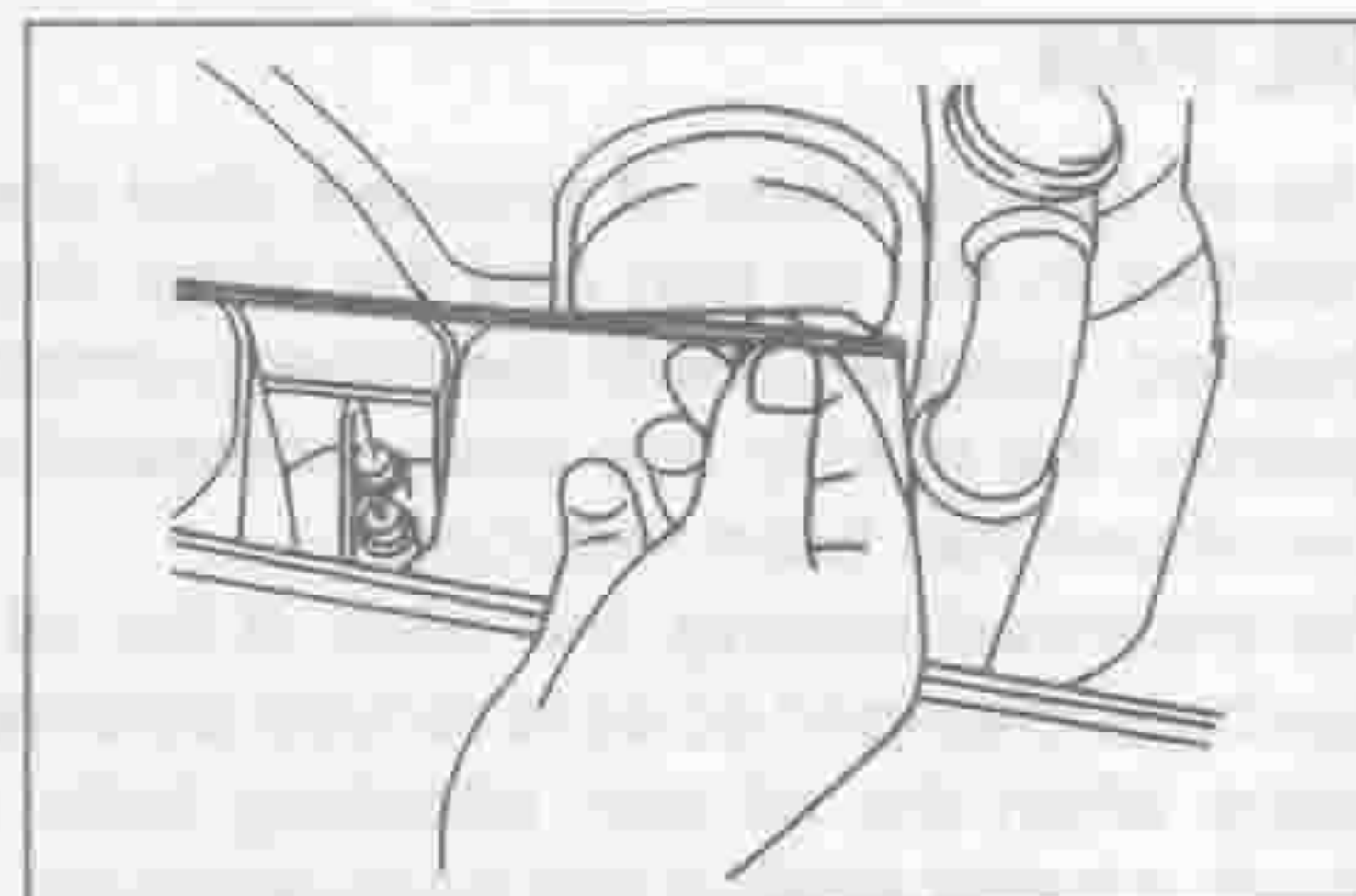
IN-VEHICLE INSPECTION

1. Check of oil quality

Check the oil for deterioration, ingress of water, discoloring or dilution.

If oil quality is poor, change the oil.

Use API grade SE or higher multigrade viscosity, fuel-efficient oil.



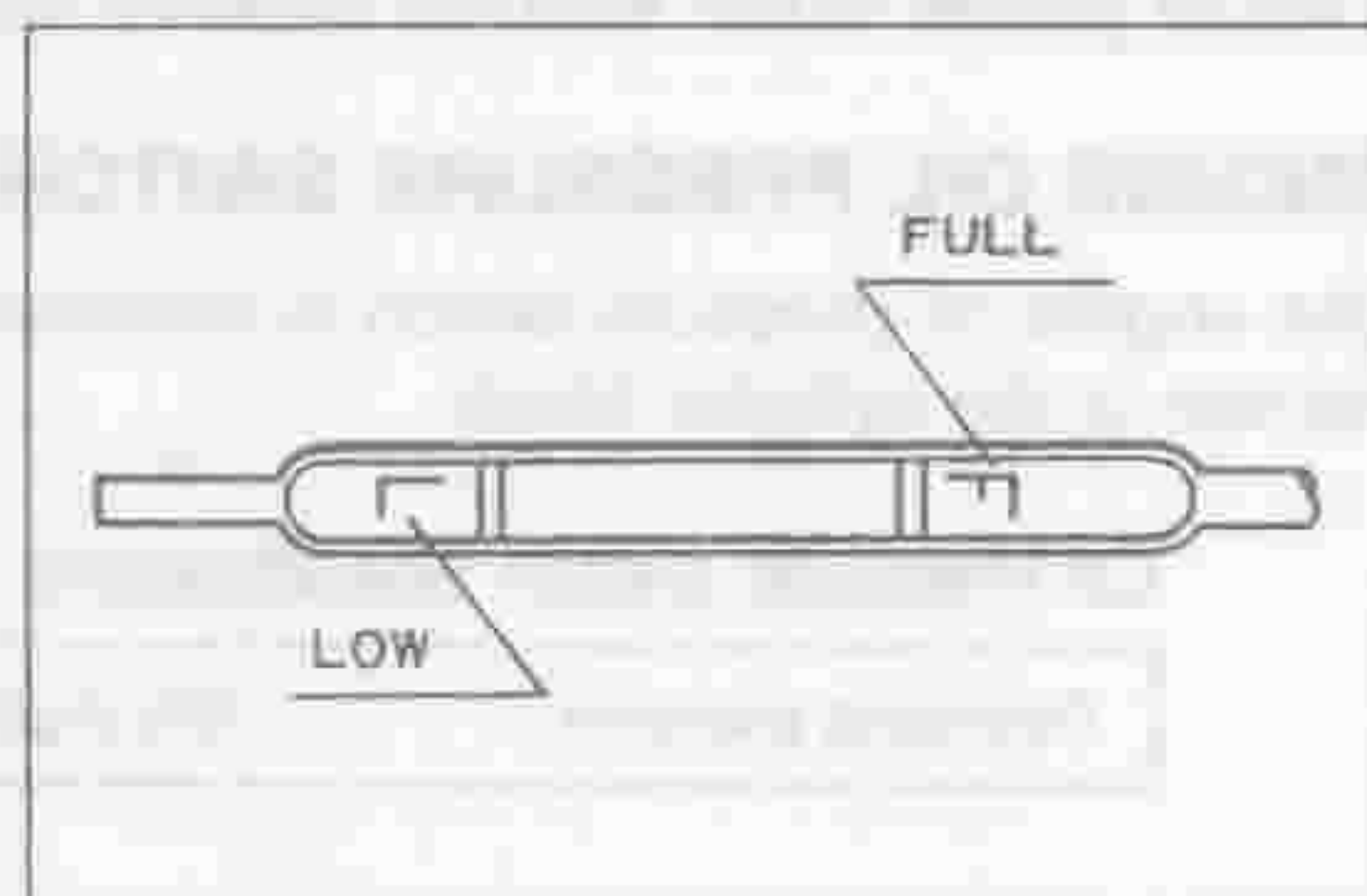
LLU00017-00013

2. Check of oil level

(1) The oil level should be between the L and F levels on the dipstick. If the level is low, check to see if any oil leakage is present. Add oil to the F level.

NOTE:

- The amount of oil between the [L] level and the [F] level equals to 0.8 dm³.
- Use API grade SE or higher multigrade viscosity, fuel-efficient oil.
- In case where the engine is stopped for a prolonged period of time, the oil level may rise above the [F] level. However, this is not abnormality.



LLU00018-00014

(2) Start the engine and warm up it thoroughly.

(3) Stop the engine. Two or three minutes later, check the oil level, using an oil level gauge.

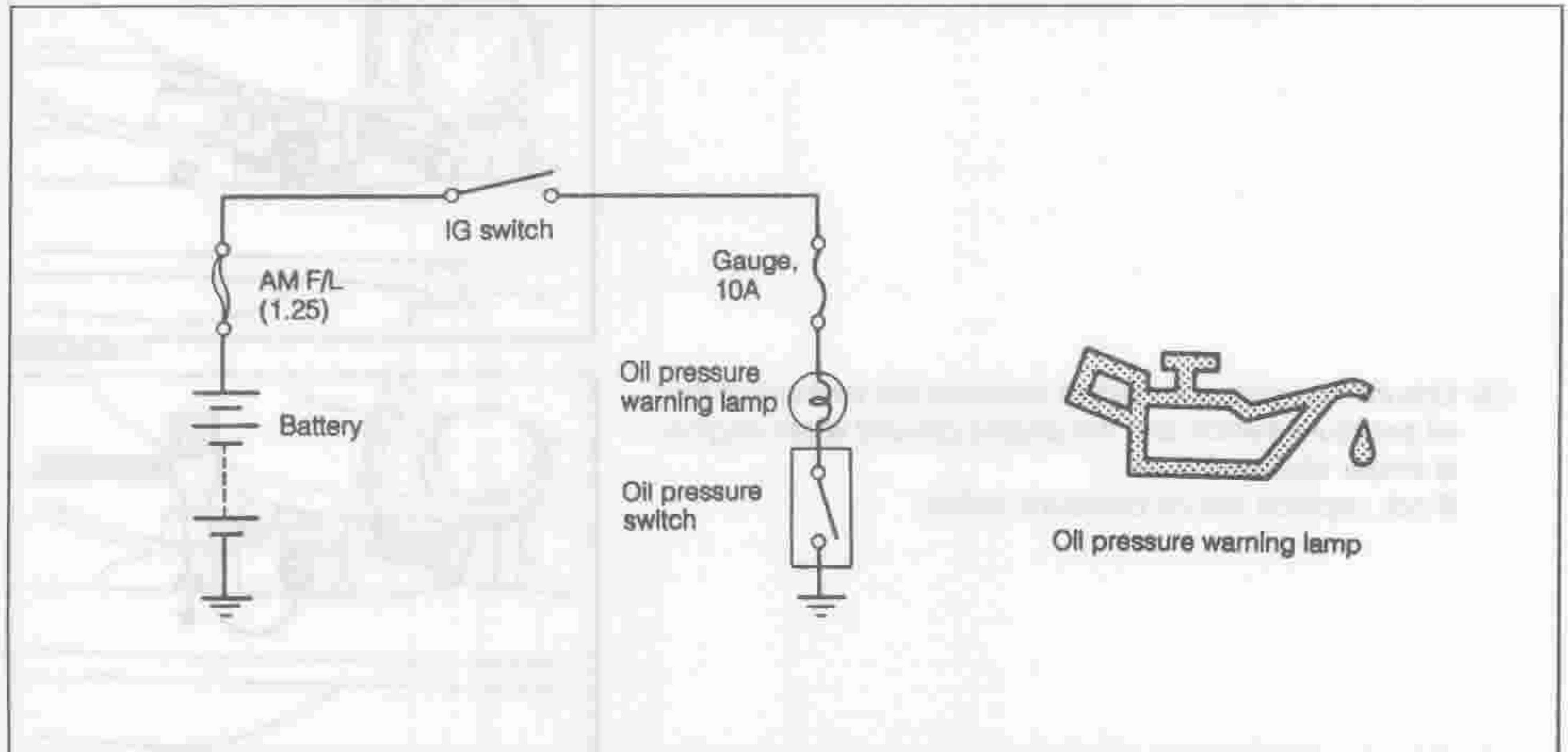
If the level is low, add oil to the F level.

NOTE:

- Use API grade SE or higher multigrade viscosity, fuel-efficient oil.

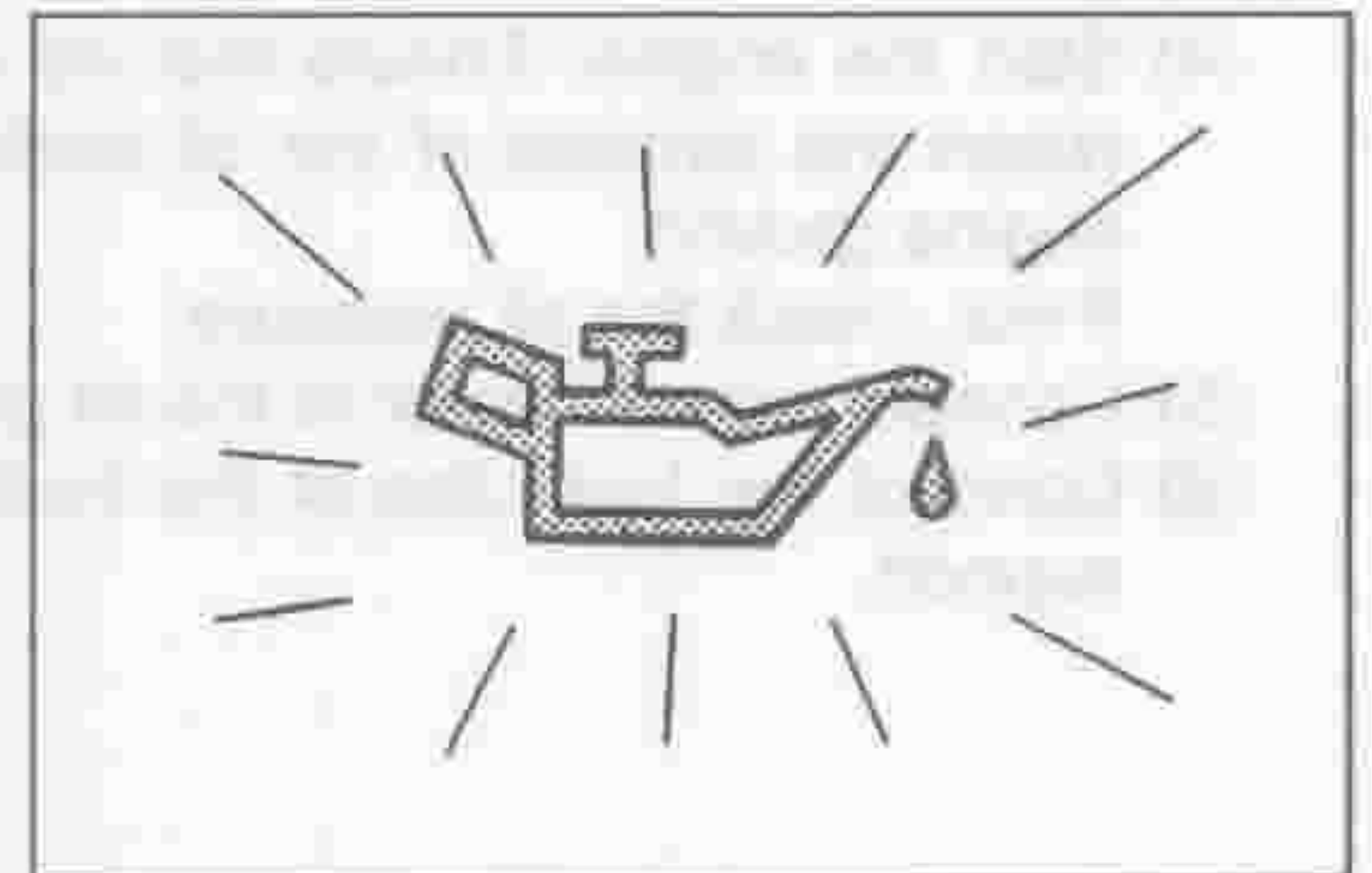
LLU00019-00000

3. Check of oil pressure by warning lamp



LLU00020-00015

- (1) Turn ON the ignition switch.
- (2) Ensure that the warning lamp goes on.
If not, check the warning lamp for bulb burnt out. Check the wiring from the warning lamp to the oil pressure switch for open wire. Also, check the oil pressure switch, as required.
(Refer to the BE section.)



LLU00021-00016

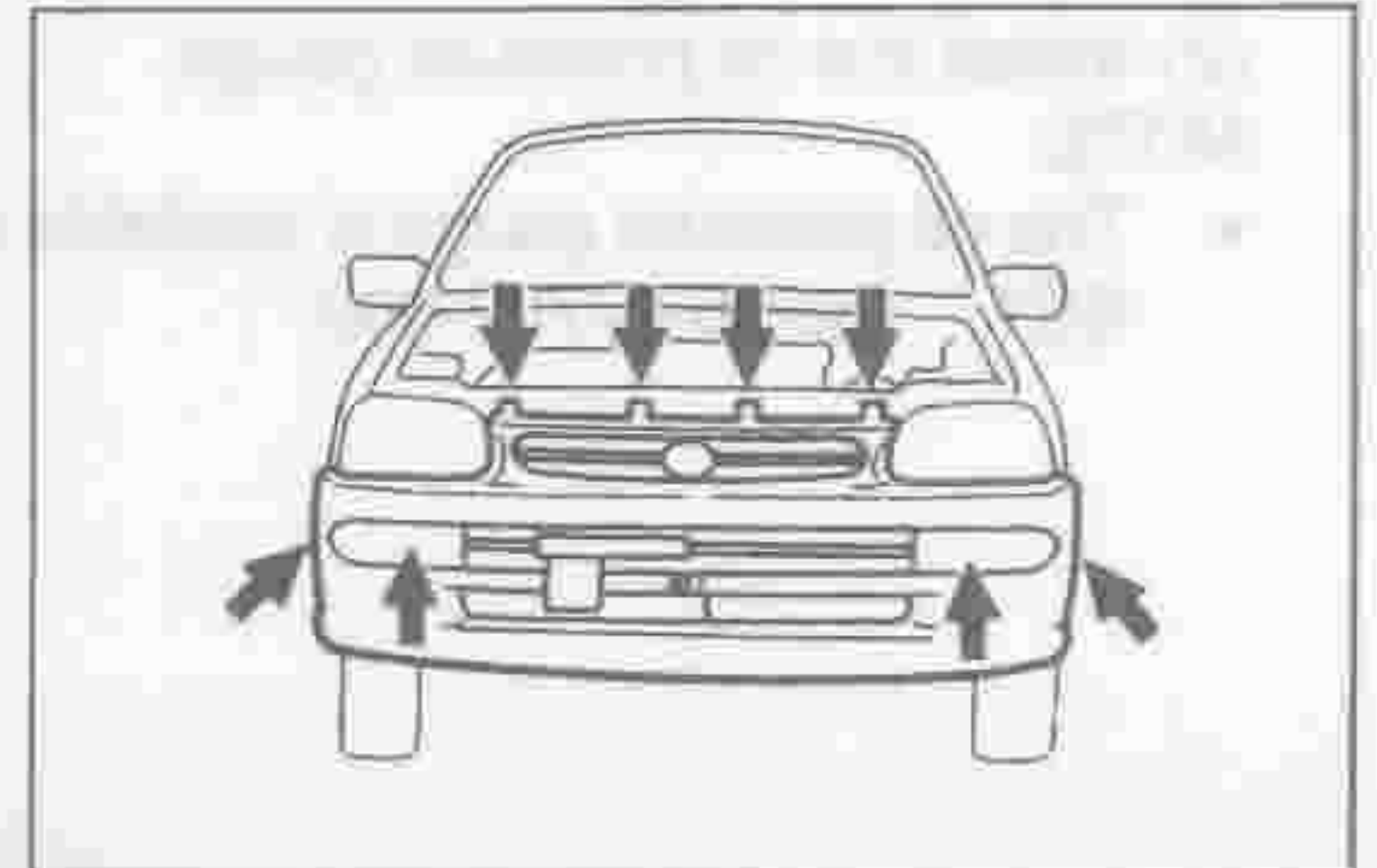
- (3) Start the engine. After the engine revolution speed has stabilized at the idle speed, ensure that the warning lamp goes out.
If not, check the wiring from the warning lamp to the oil pressure switch for open wire. Also, check the oil pressure switch, as required.



LLU00022-00017

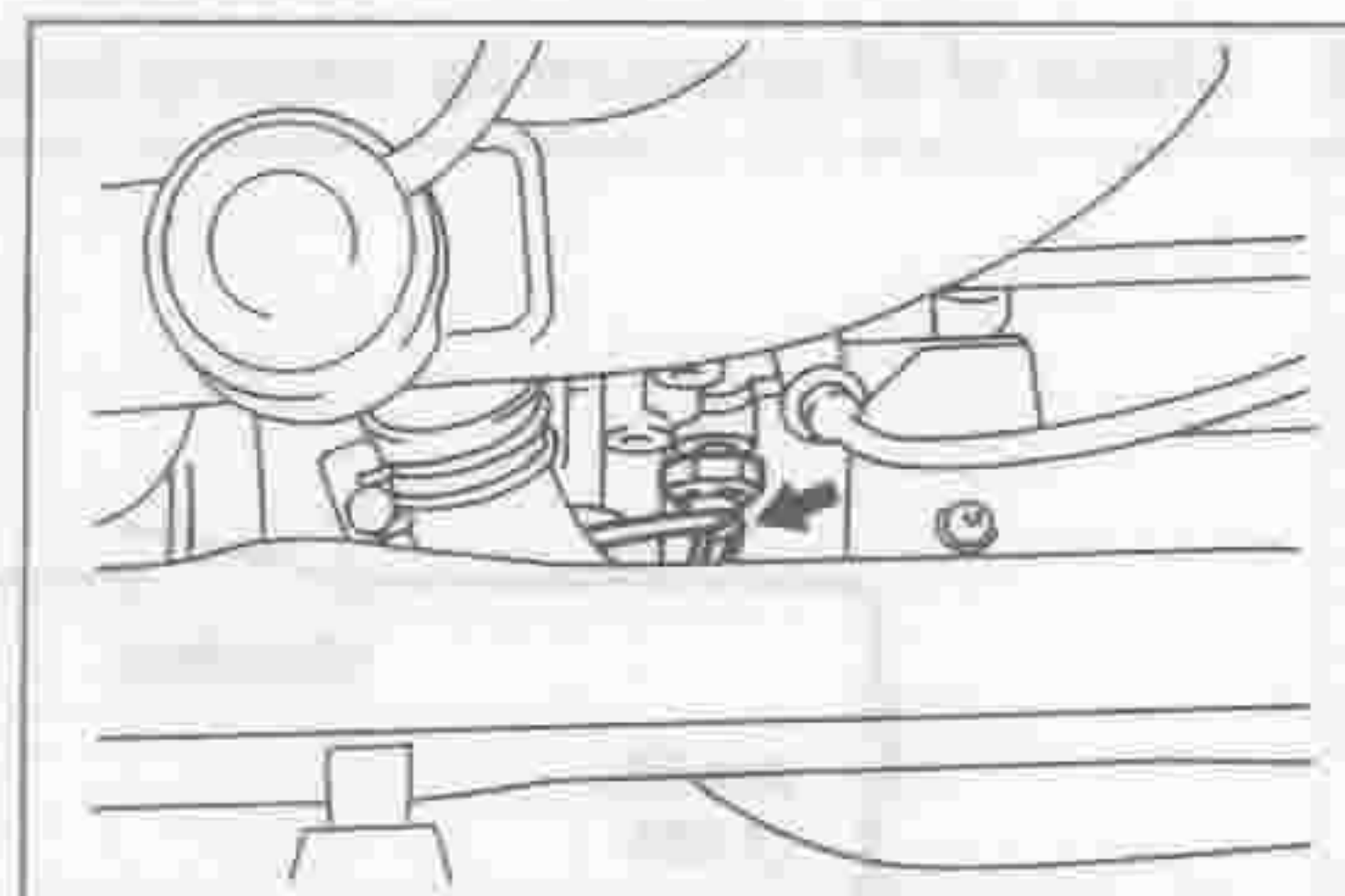
4. Check of oil pressure switch

- (1) Remove the four clips and bumper retaining bolts.



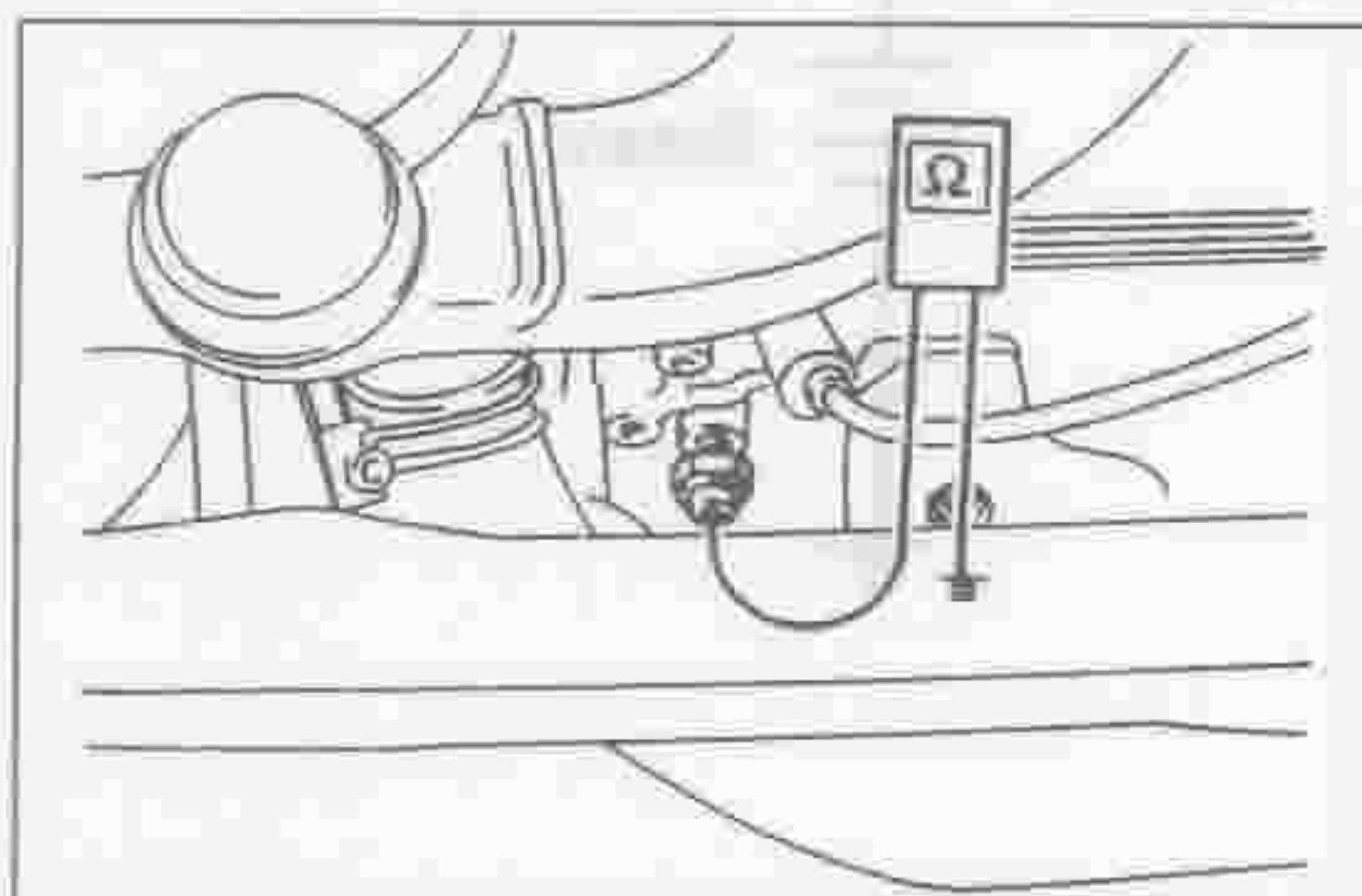
LLU00023-00018

(2) Disconnect the connector from the oil pressure switch.



LLU00024-00019

(3) Ensure that continuity exists between the terminal of the oil pressure switch and the engine ground when engine is under stopped state.
If not, replace the oil pressure switch.



LLU00025-00020

(4) Start the engine. Ensure that no continuity exists between the terminal of the oil pressure switch and the engine ground.
If not, check the oil pressure.

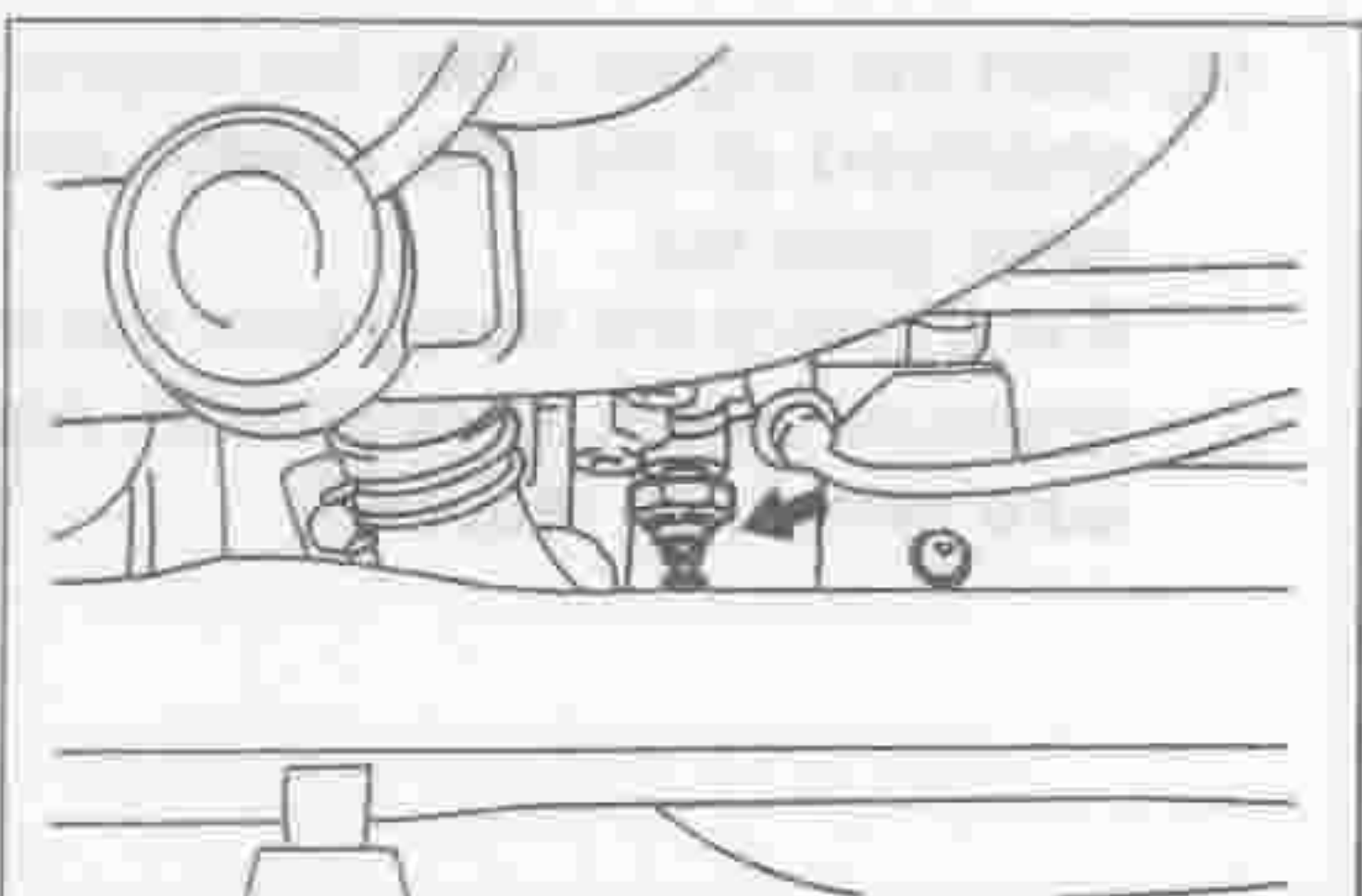
(5) Connect the connector to the oil pressure switch.

(6) Connect the four clips of the front grill to the radiator support.

LLU00026-00000

5. Check of oil pressure

(1) Remove the oil pressure switch.

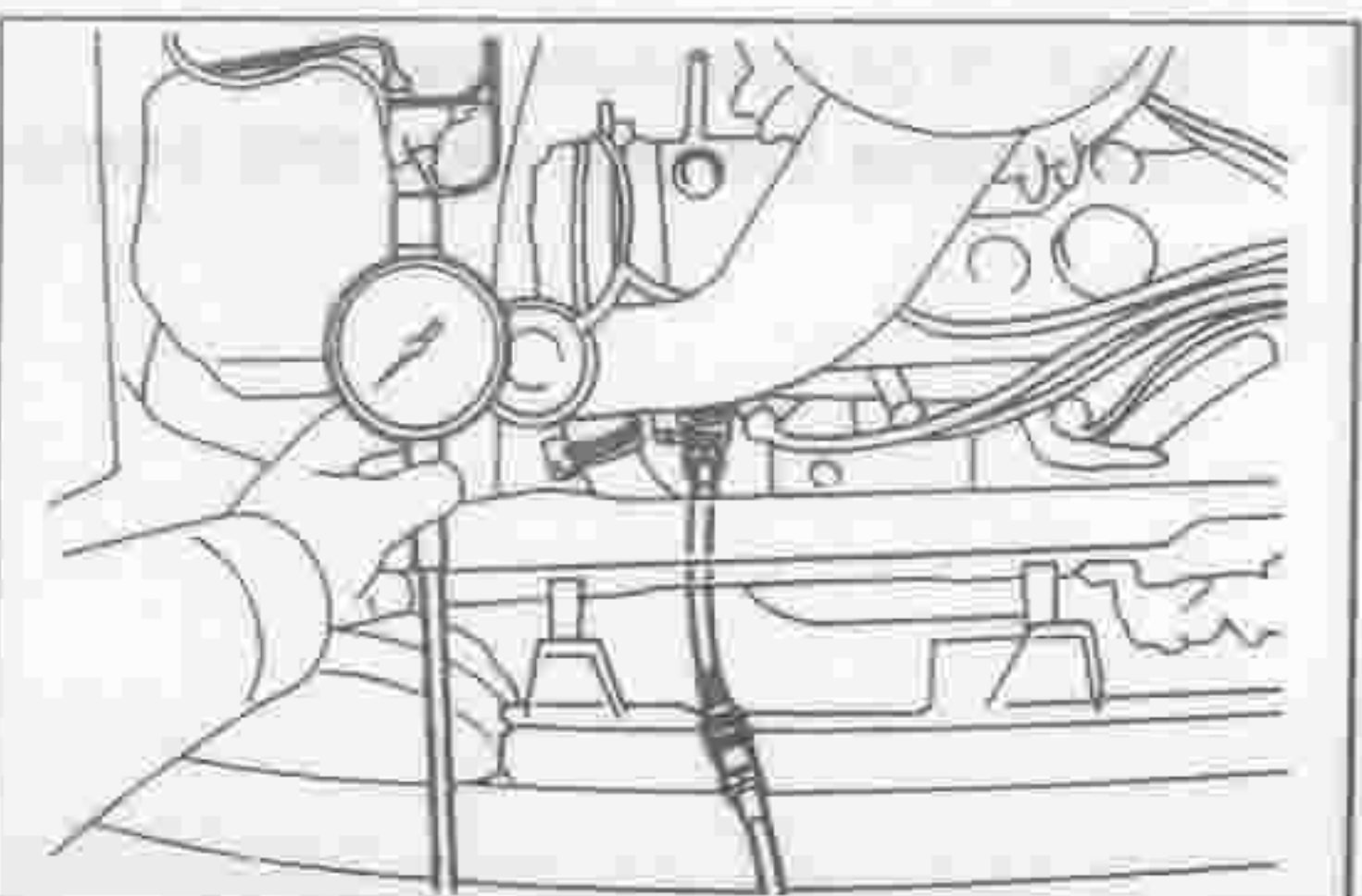


LLU00027-00021

(2) Install the oil pressure gauge.

NOTE:

- The oil pressure gauge is available as the following SST.
SST: 09990-87702-000



LLU00028-00022

(3) Measurement of oil pressure

Start the engine and measure the oil pressure. Ensure that the oil pressure conforms to the specified value.

At 1000 rpm: 13.7 - 24.5 kPa (1.4 - 2.5 kgf/cm²)

At 3000 rpm: 45.1 - 53.0 kPa (4.6 - 5.4 kgf/cm²)

If the measured value fails to conform to the specified value, check and repair the oil pump. Also, check to see if each oil clearance is within the specified value, as required.

(Refer to the EM section.)

When the warning lamp goes on even if the oil pressure is normal, replace the oil pressure switch. (See page LU-9.)

(4) Remove the oil pressure gauge.

(5) Install the oil pressure switch.

LLU00029-00000

ENGINE OIL CHANGE & OIL FILTER REPLACEMENT

1. Draining engine oil

(1) Start the engine and allow the engine oil to warm up.

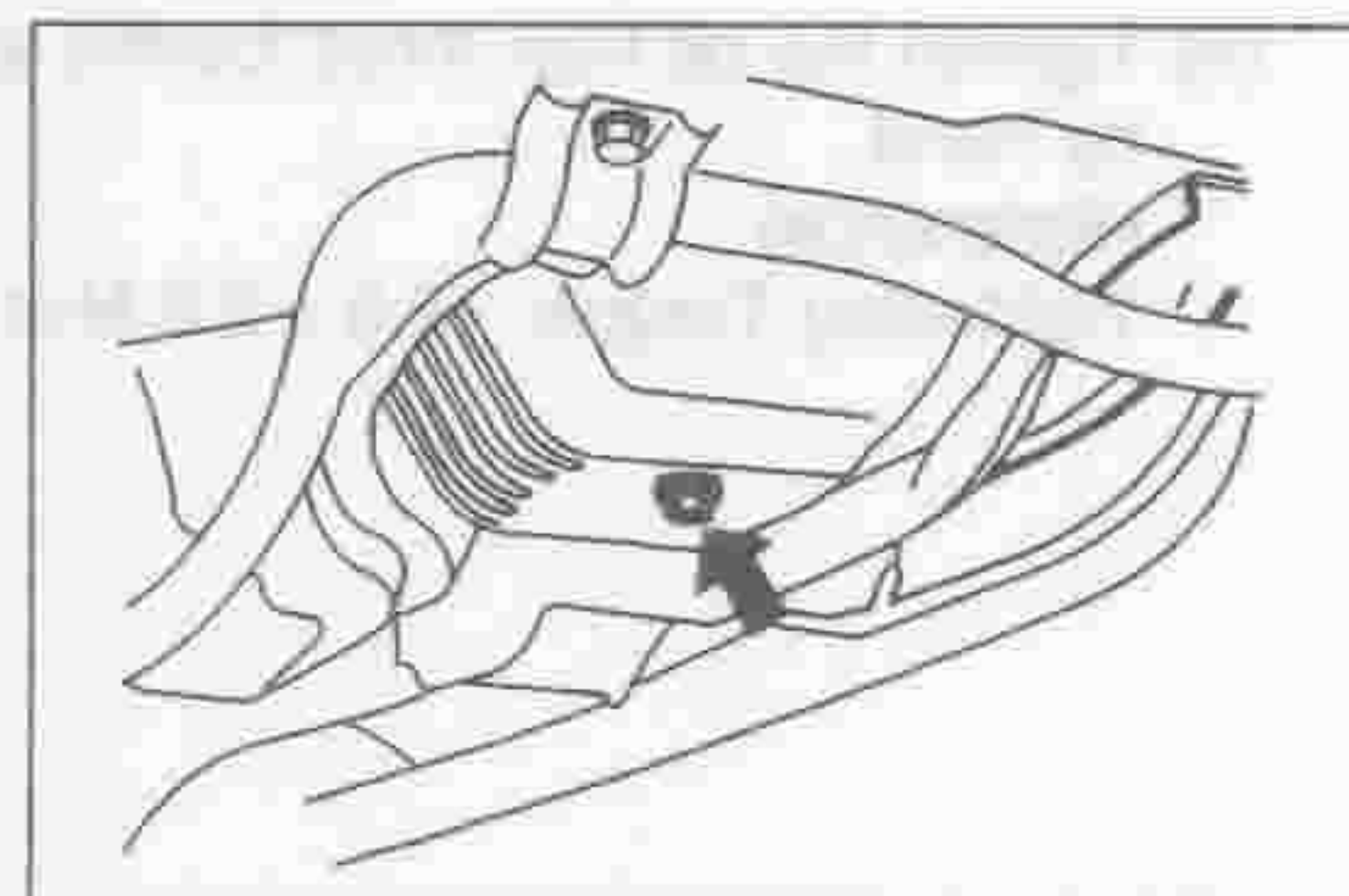
(2) Stop the engine.

(3) Place a suitable container under the oil drain plug.

(4) Drain the oil by removing the oil drain plug.

CAUTION:

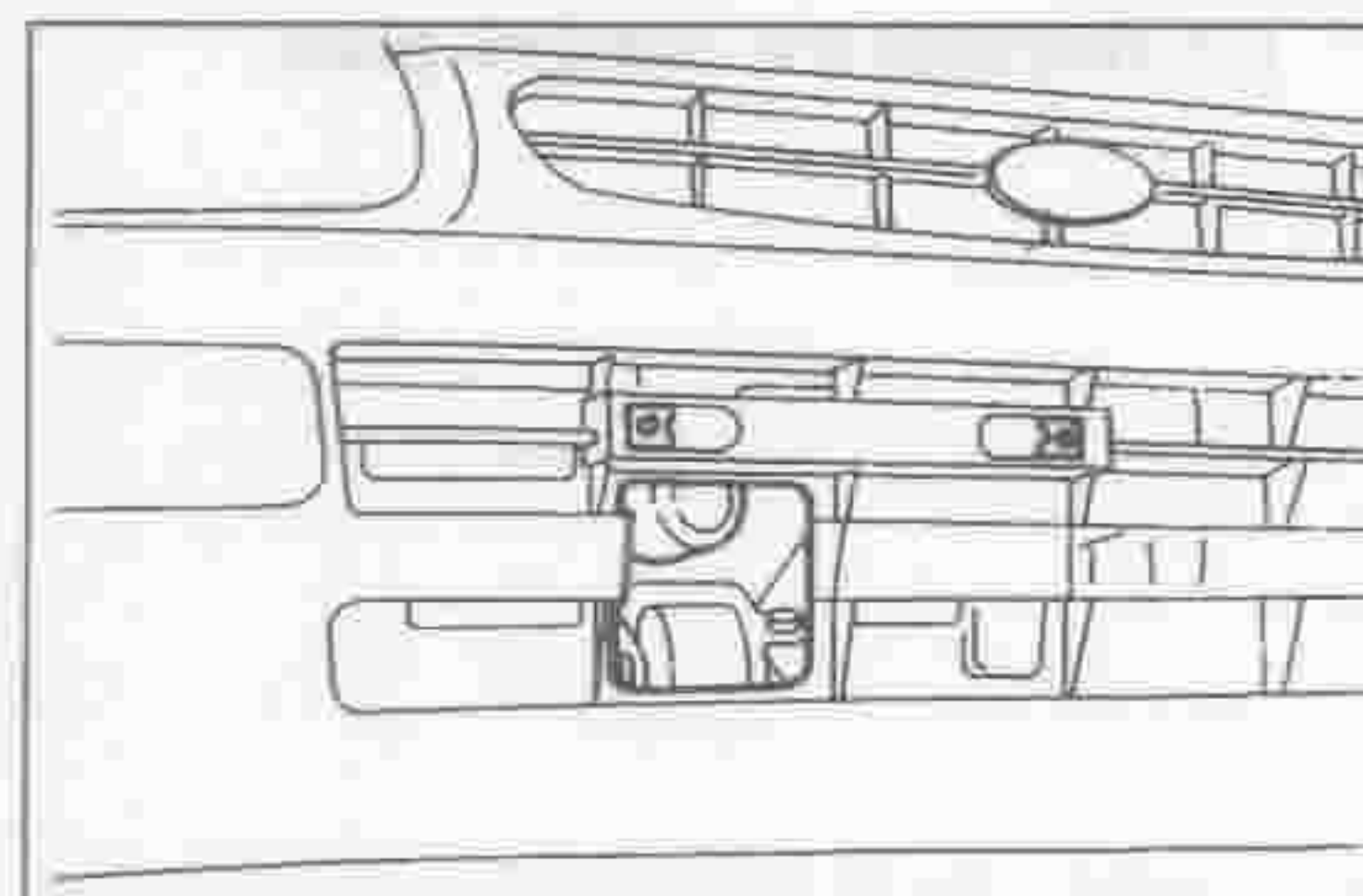
- When the oil is hot, care must be exercised to avoid getting scalded.



LLU00030-00023

2. Replacement of oil filter

(1) Remove the number plate.

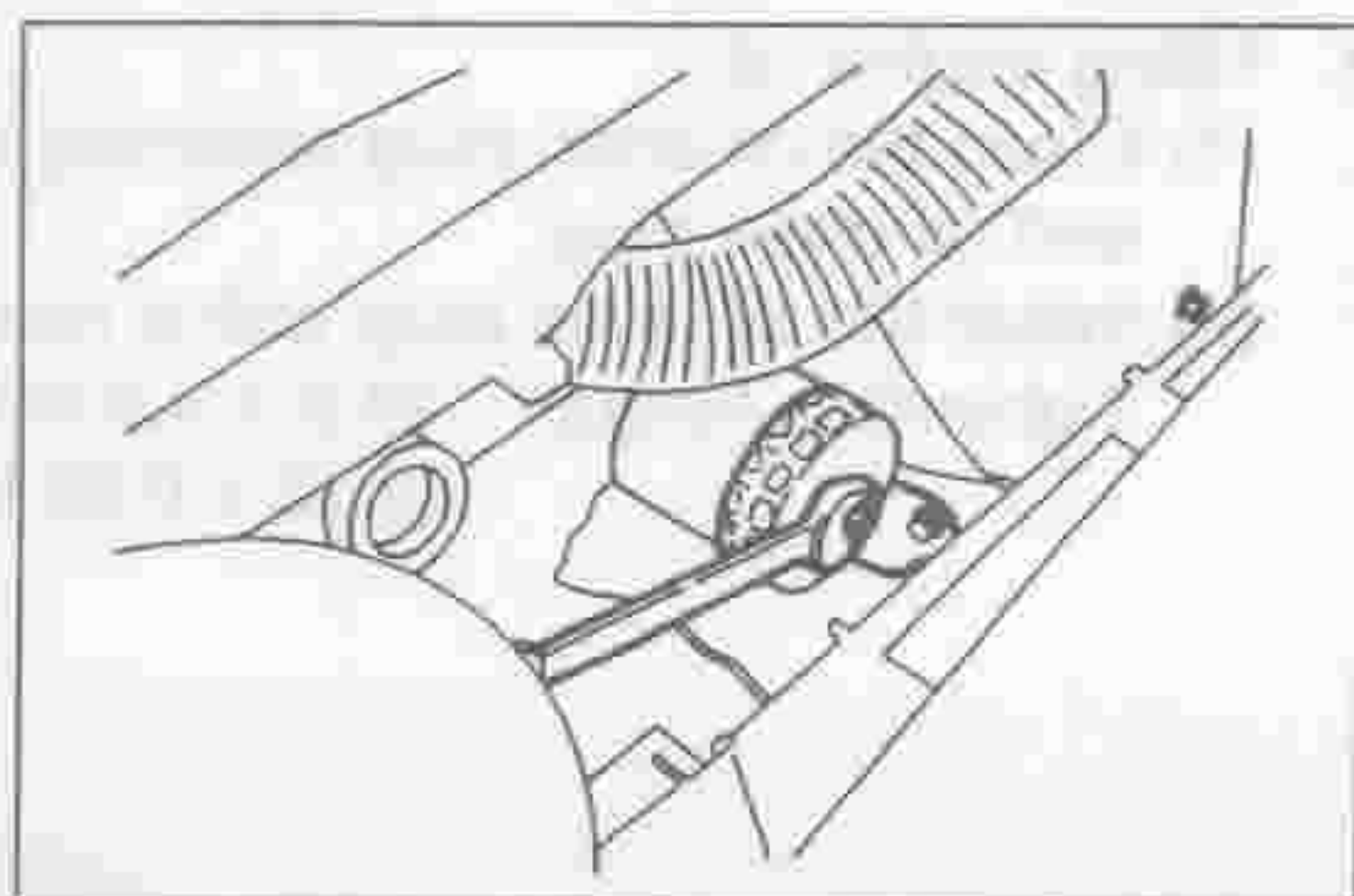


LLU00031-00024

(2) Remove the oil filter element, using a suitable oil filter wrench.

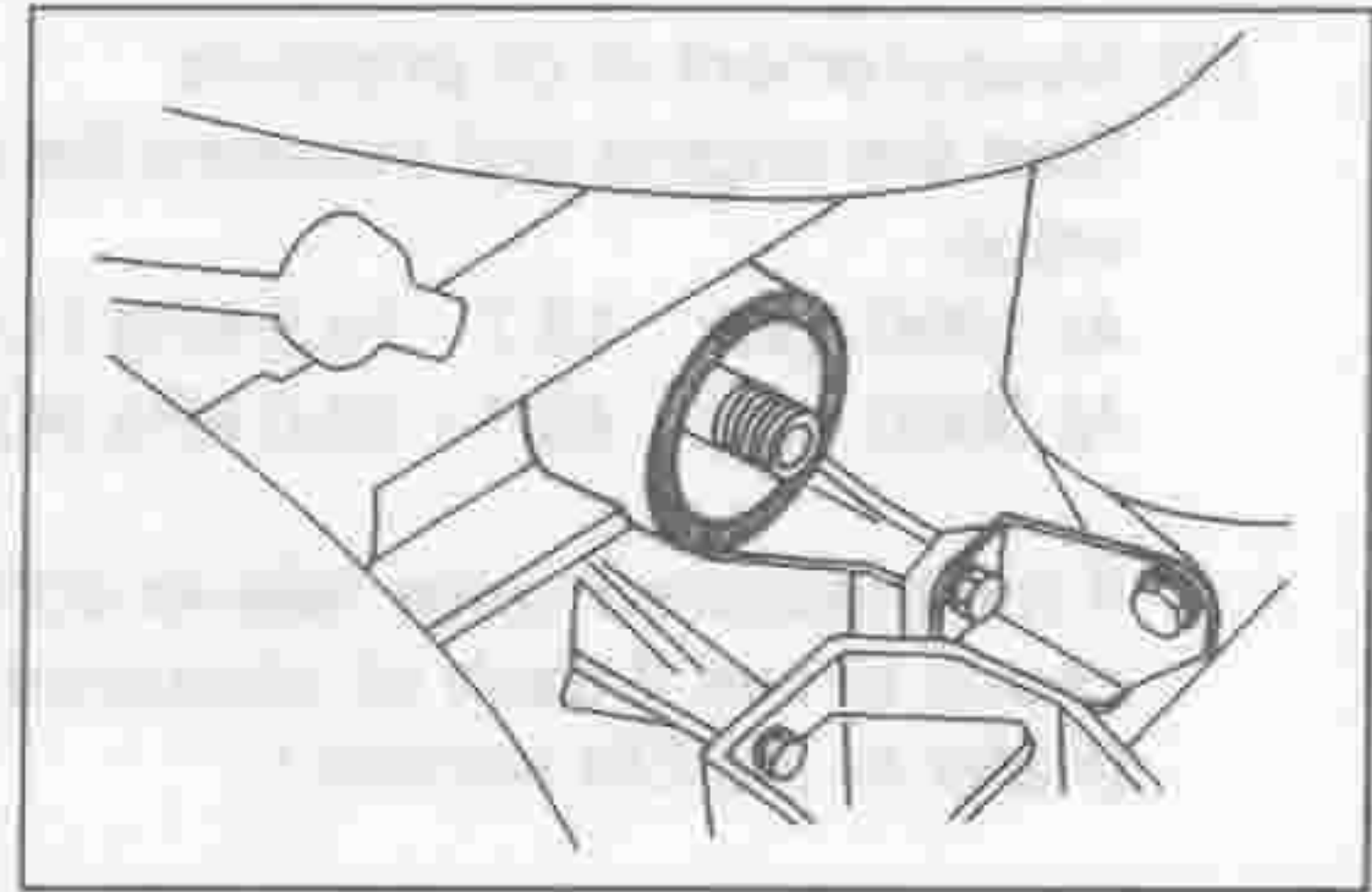
NOTE:

- Place a suitable container under the oil filter because the engine oil flows out.



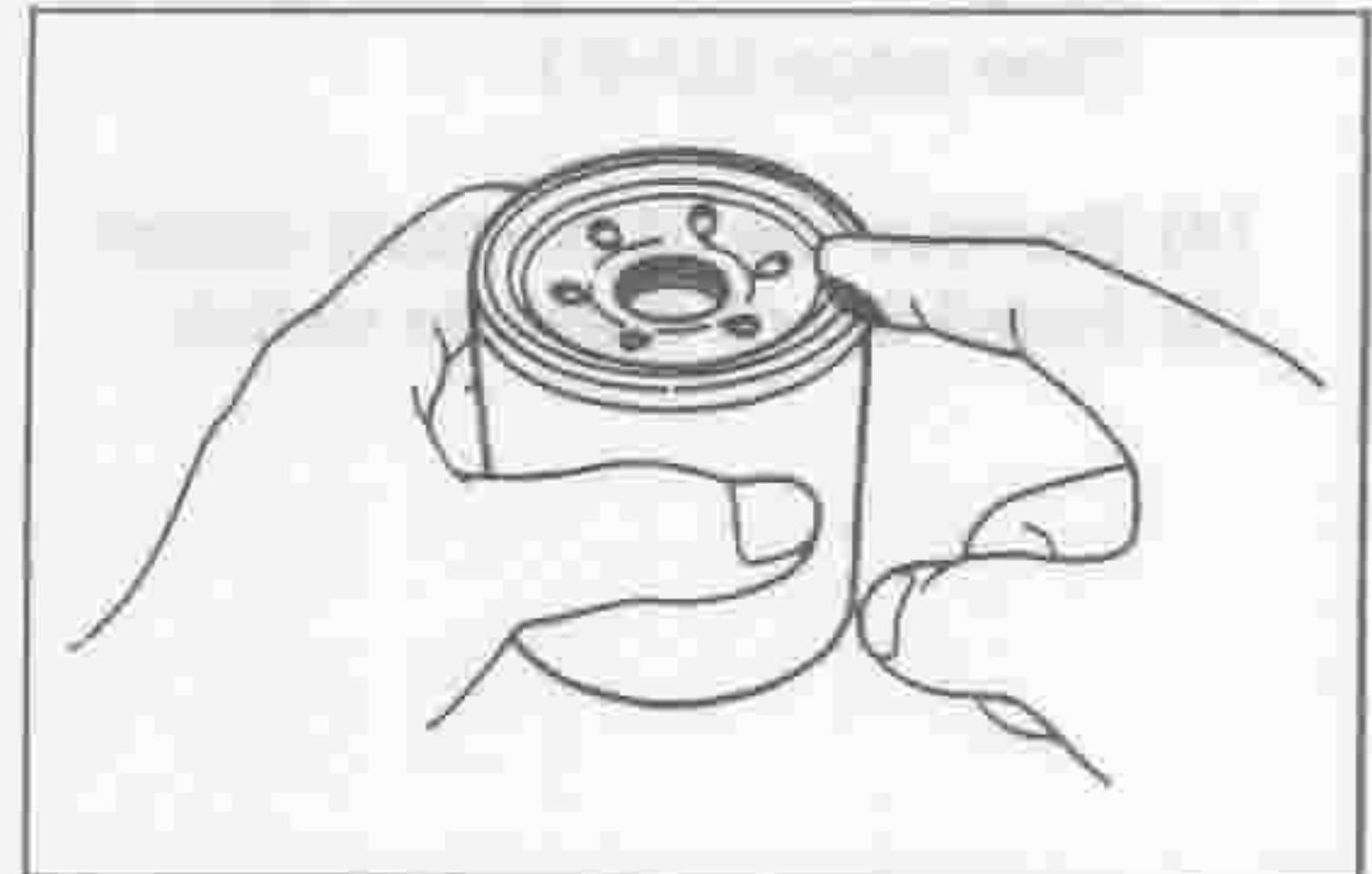
LLU00032-00025

- (3) Inspect and clean the oil filter installation surface.



LLU00033-00026

- (4) Thinly apply engine oil to the O-ring of a new oil filter.
 (5) Screw in the oil filter by hand, until the O-ring of the oil filter contacts the oil filter installing surface.

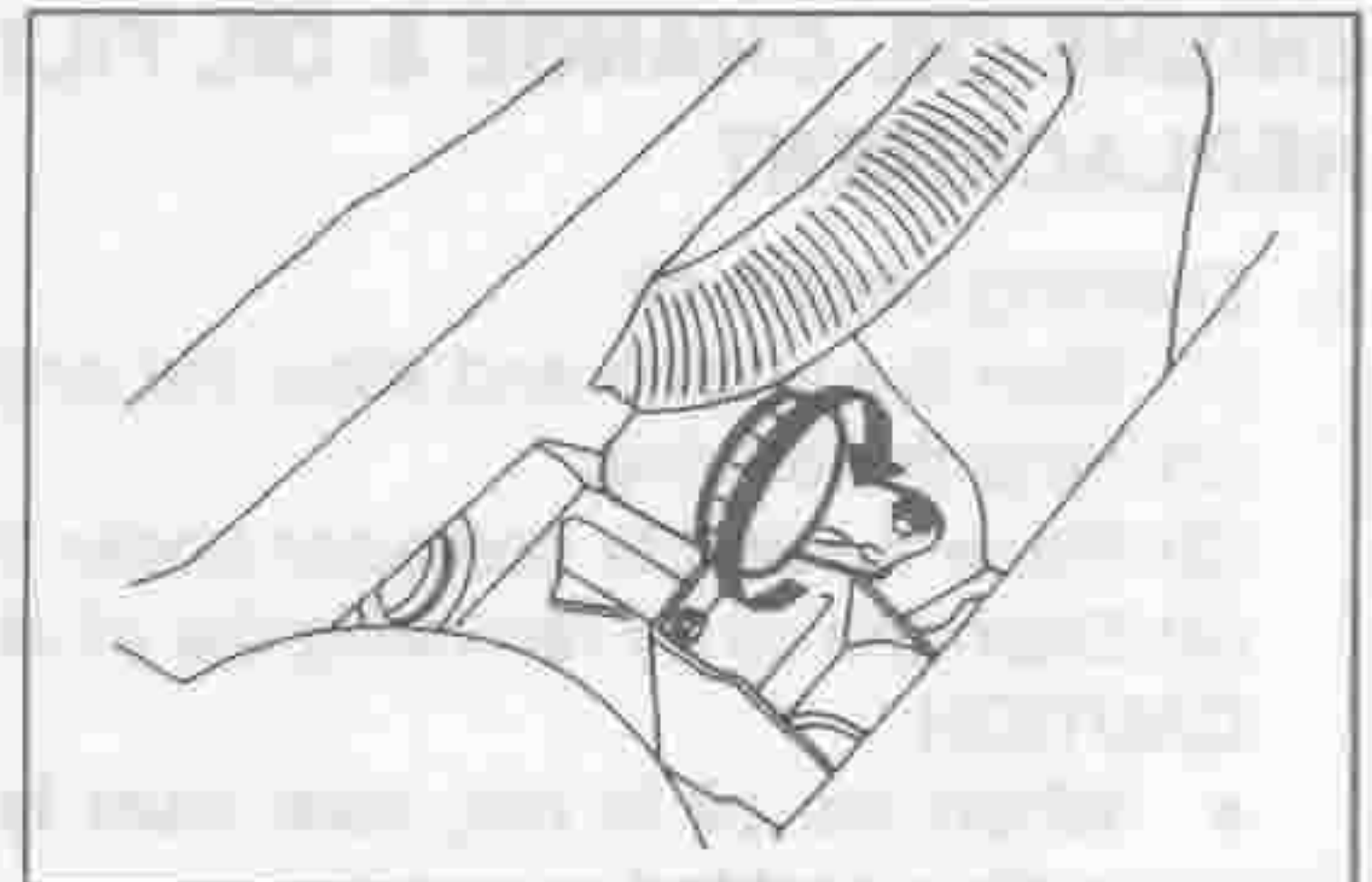


LLU00034-00027

- (6) Tighten the oil filter three fourths to one complete turn, by hand.

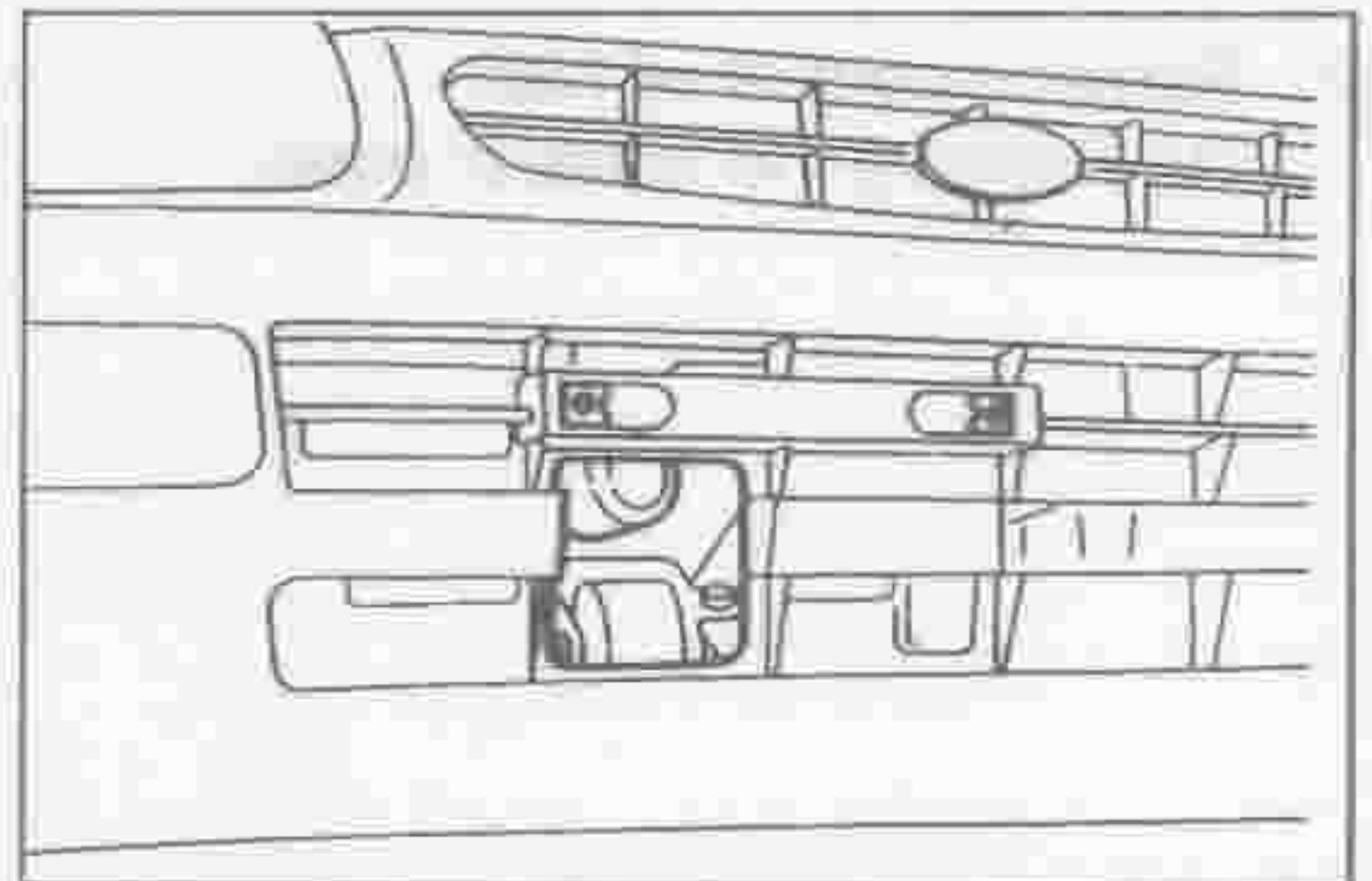
(Reference)

Tightening Torque: $9.8 \pm 2.0 \text{ N}\cdot\text{m}$ ($1.00 \pm 0.20 \text{ kgf}\cdot\text{m}$)



LLU00035-00028

- (7) Reinstall the number plate.



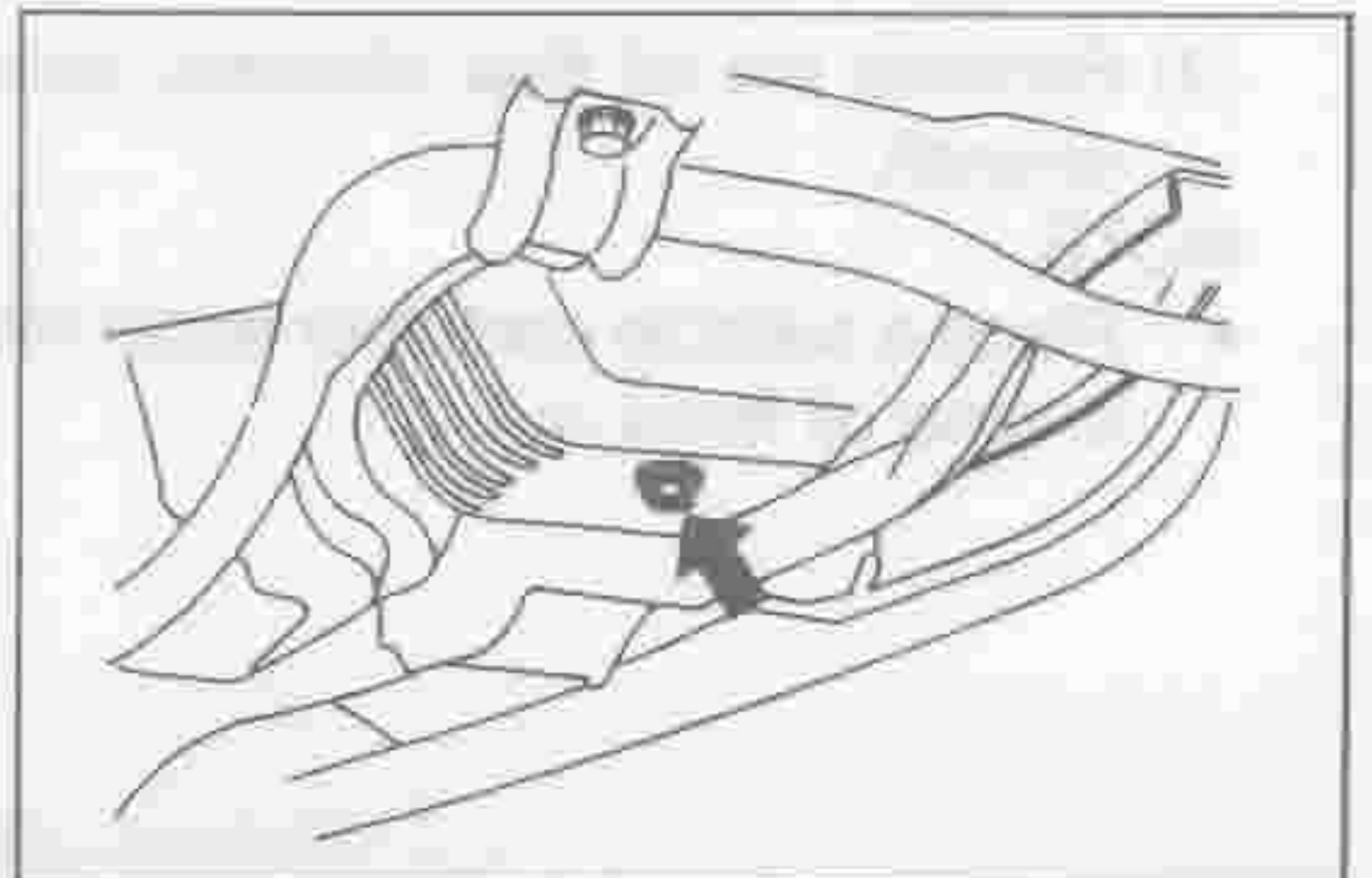
LLU00036-00029

3. Filling engine oil

- (1) Clean the oil drain plug attaching surface of the oil pan and oil drain plug.

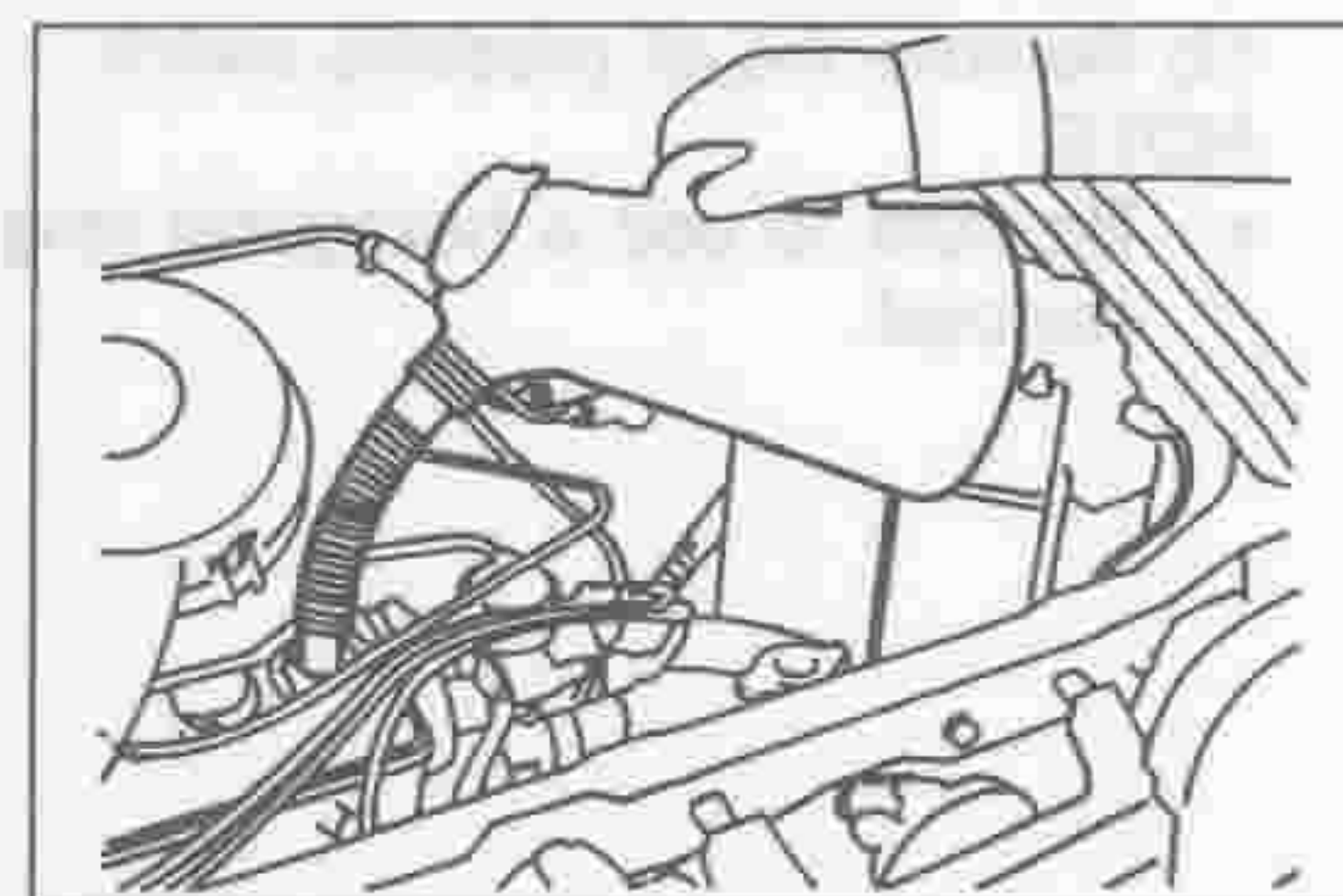
- (2) Install the oil drain plug with a new gasket interposed.

Tightening Torque: $24.5 \pm 4.9 \text{ N}\cdot\text{m}$
 ($2.50 \pm 0.50 \text{ kgf}\cdot\text{m}$)



LLU00037-00030

- (3) Pour the engine oil to the engine.
The oil should be API grade SE or higher multigrade viscosity, fuel-efficient oil.
(See page LU-8.)



LLU00038-00031

NOTE:

- The right table indicates the oil viscosity.
However, be sure to follow the instructions of the oil manufacturer.

Engine lubrication

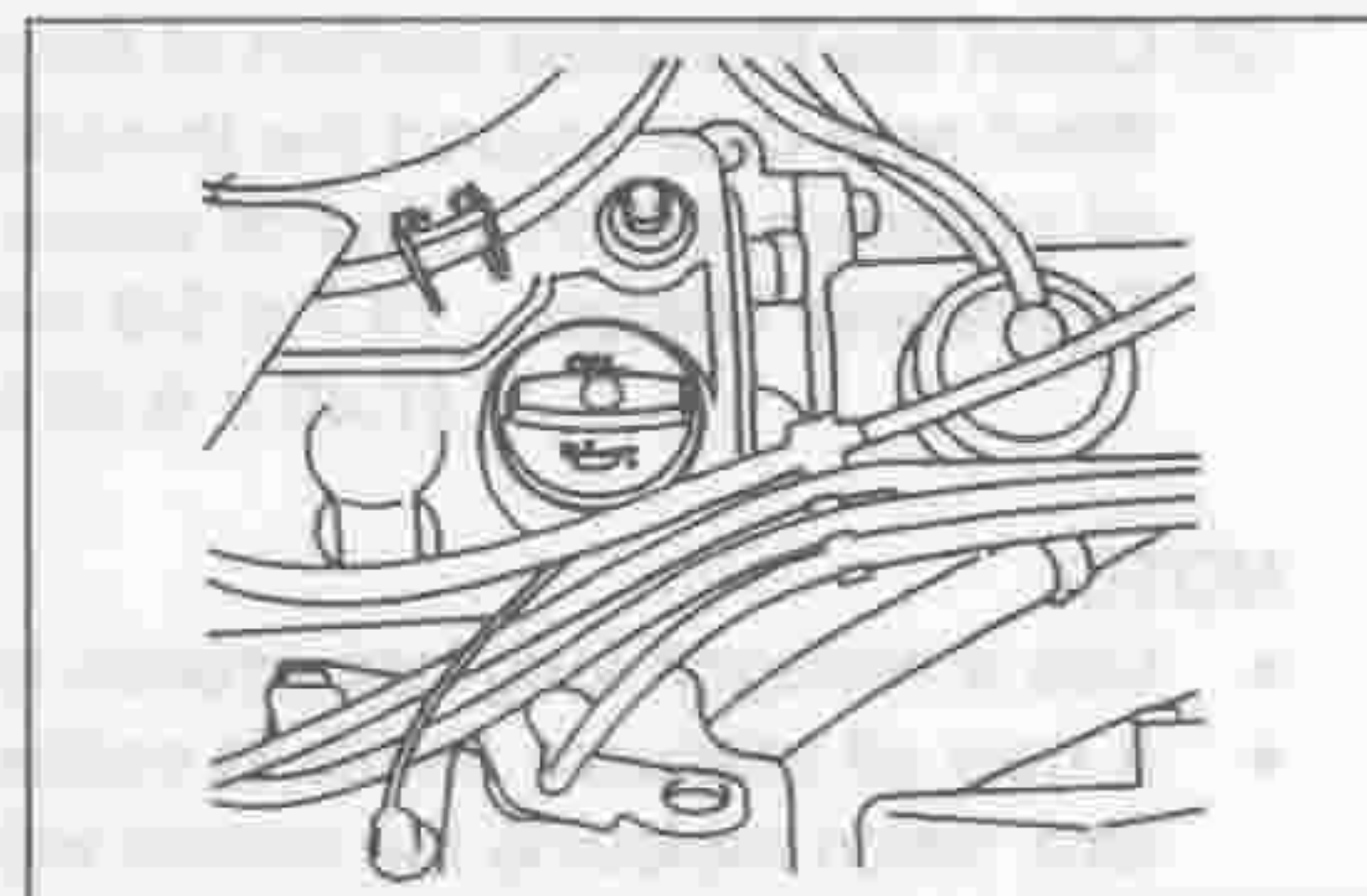
Classification
API SE or higher multigrade viscosity

TEMP °C (°F)	-29 (-20)	-18 (9)	-7 (20)	4 (40)	16 (60)	27 (80)	35 (95)
Viscosity	10W-30, 10W-40, 10W-50, 20W-40, 20W-50						
	5W-30				30		
			20				

Atmosphere temperature range anticipated before next oil change

LLU00039-00032

- (4) Close the oil filler cap in such a way that the cap may assume the position as indicated in the right figure.



LLU00040-00033

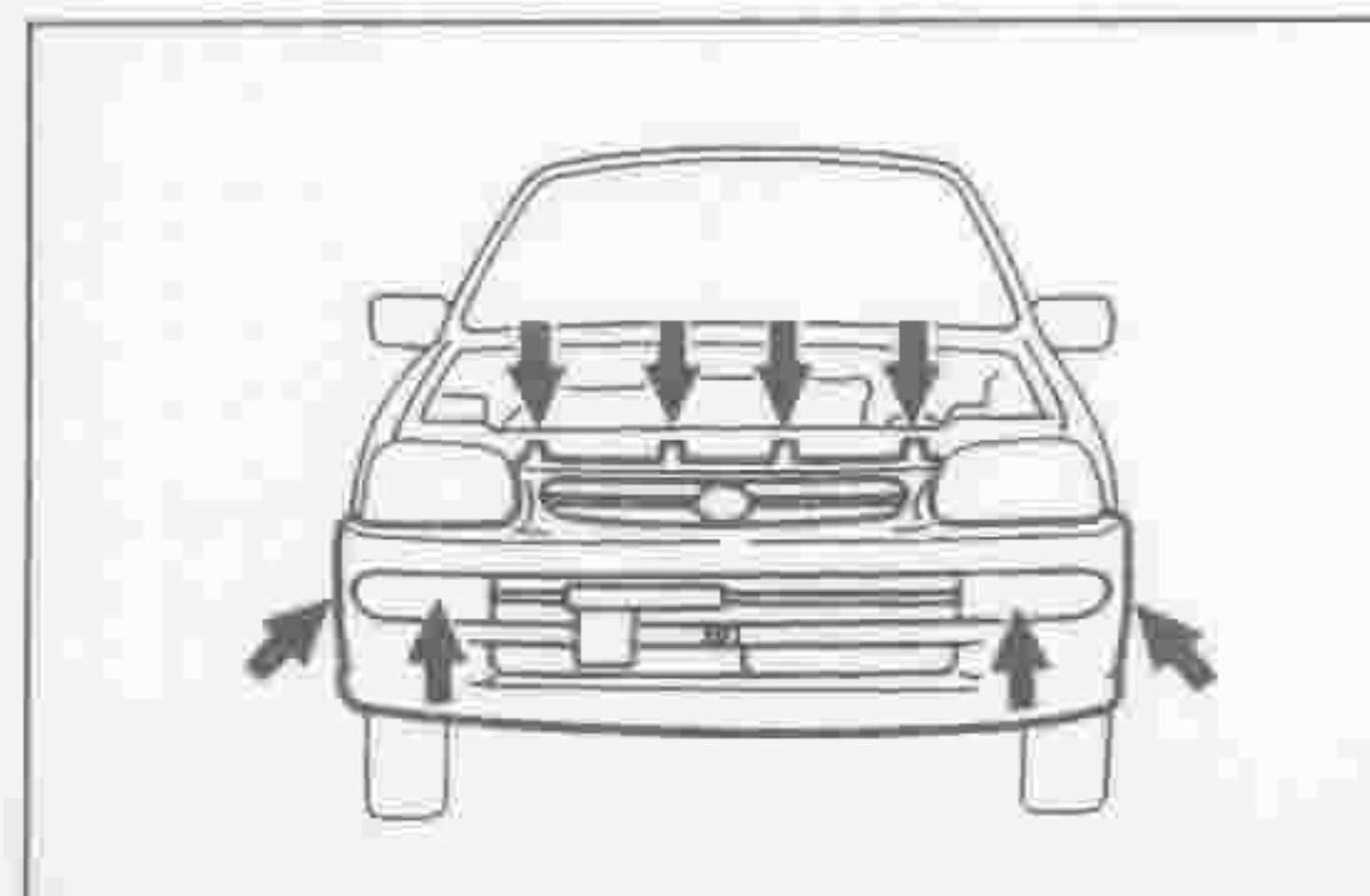
- (5) Start the engine and check it for leakage.
Repair the leaky point if oil leakage exists.
- (6) Stop the engine. After a lapse of two or three minutes, check the oil level.
If oil level is below the full level, replenish the oil to the full level.
(See page LU-8.)

LLU00041-00000

REPLACEMENT OF OIL PRESSURE SWITCH

1. Removal

- Disengage the four clips and bumper retaining bolts.
- Disconnect the connector from the oil pressure switch.

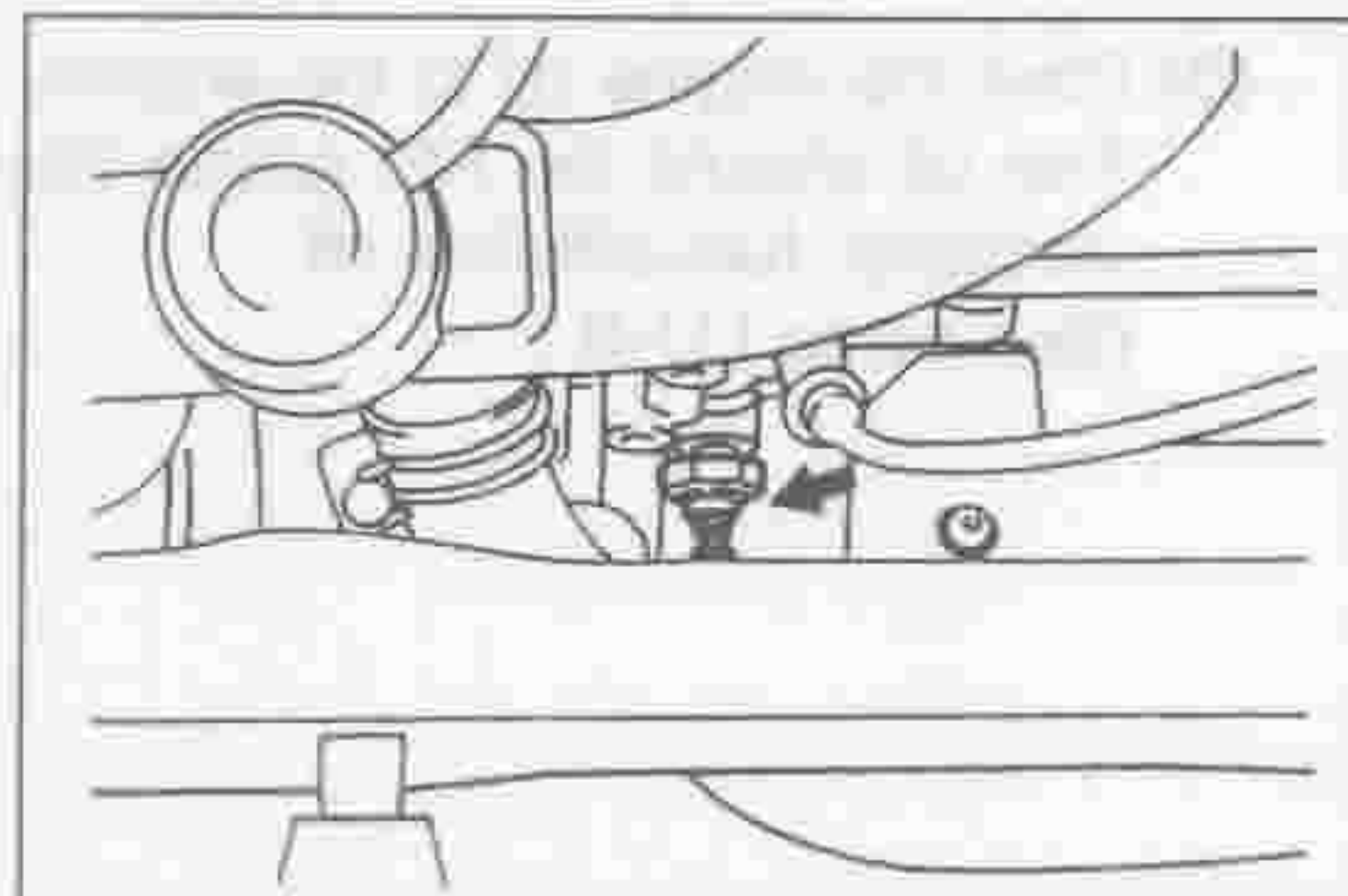


LLU00042-00034

(3) Remove the oil pressure switch.

NOTE:

- Be sure to use a hexagonal long box wrench for the removal.



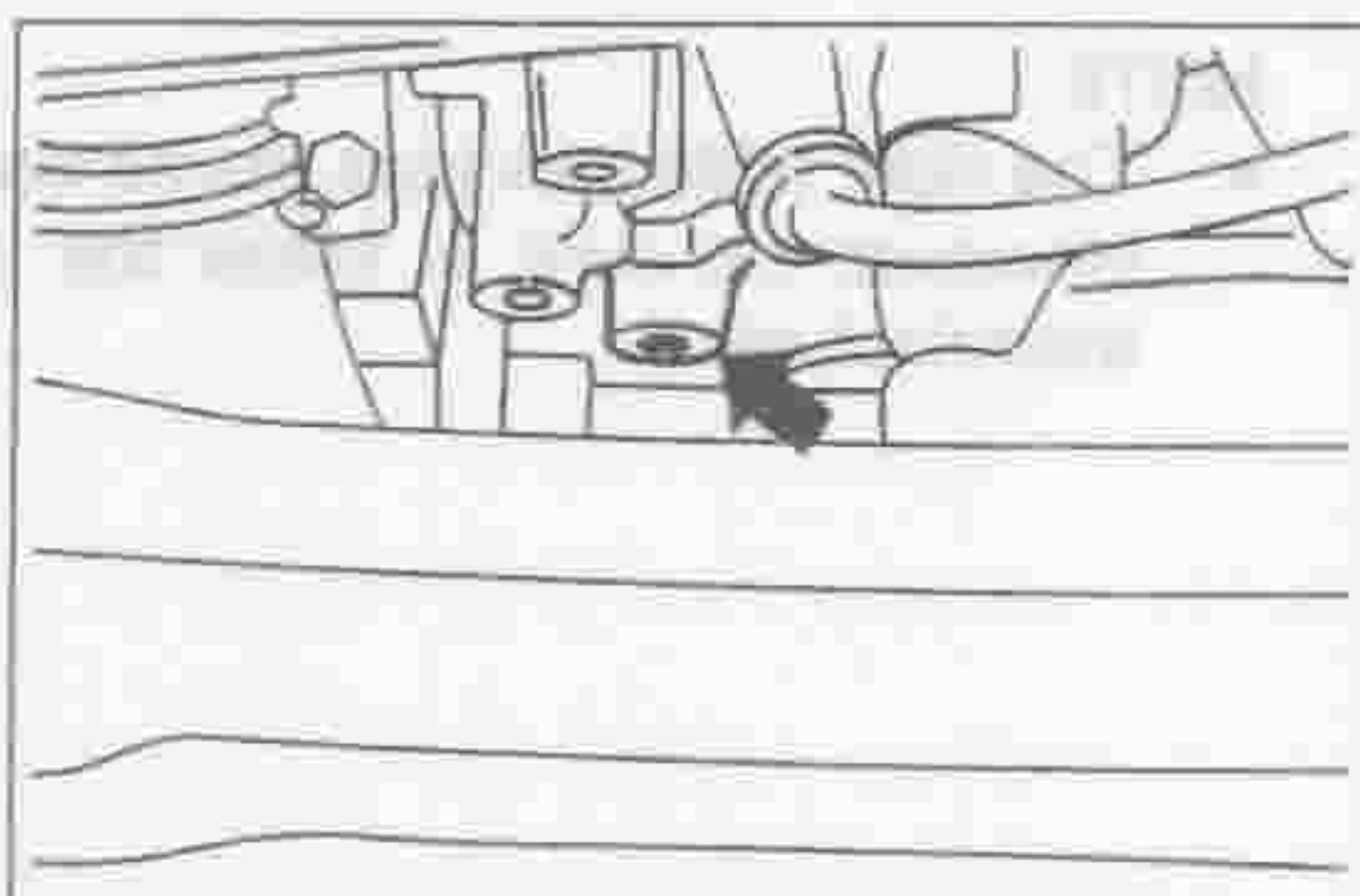
LLU00043-00035

2. Installation

(1) Clean the oil pressure switch attaching hole of the cylinder block.

NOTE:

- Be very careful not to allow any admission of dust or the like.



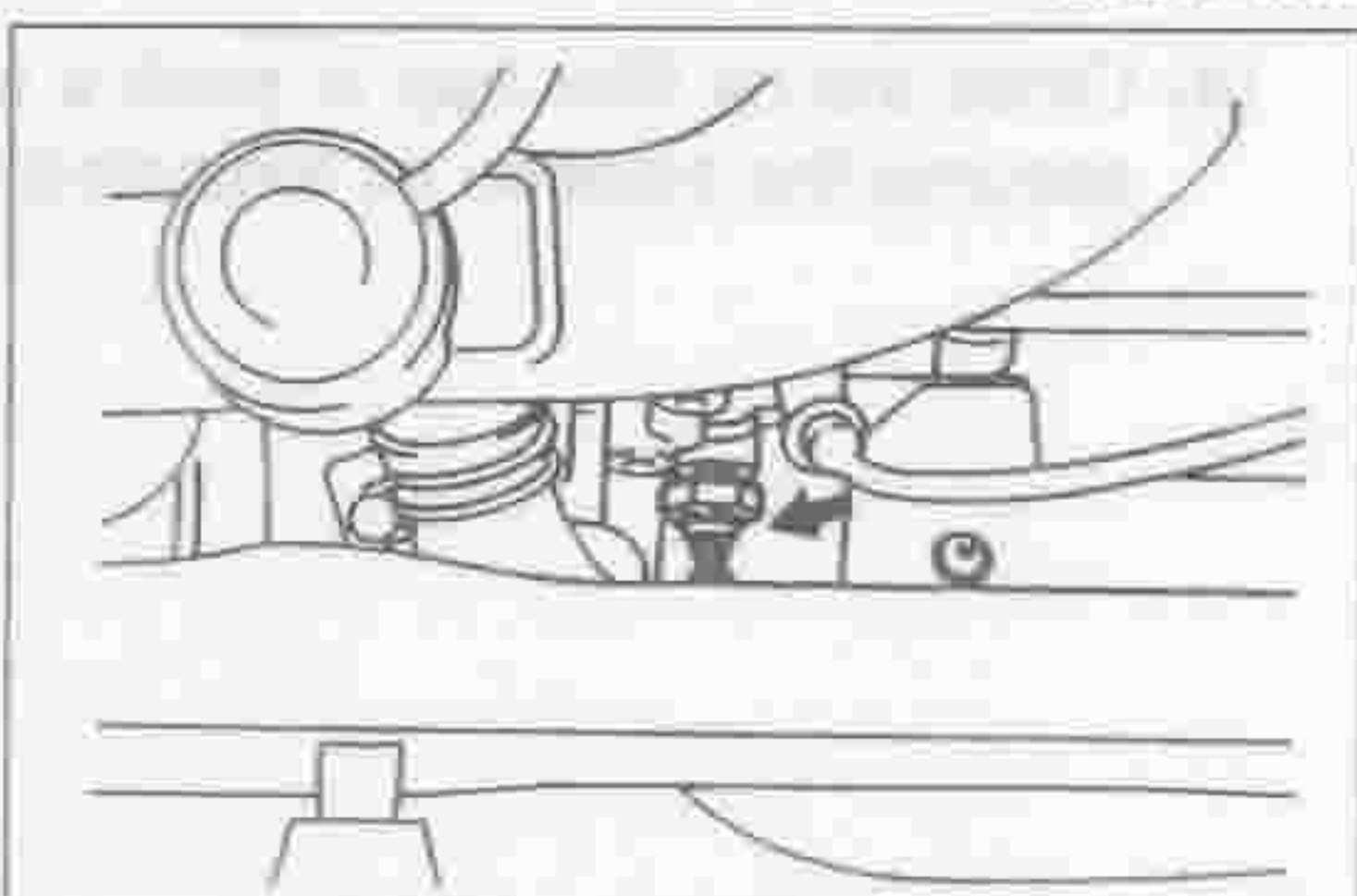
LLU00044-00036

(2) Clean the threaded portion of the oil pressure switch. Wind seal tape around the threaded portion. Install the oil pressure switch in the oil pump.

Tightening Torque: 13.7 ± 3.9 N·m
(1.40 ± 0.40 kgf·m)

NOTE:

- Use a hexagon long box wrench for the installation.
- A new oil pressure switch is coated with sealer. Therefore, when replacing the sensor with a new one, remove the sealer thoroughly before winding seal tape.
- Be sure to clean the hole treads at the oil pump side.



LLU00045-00037

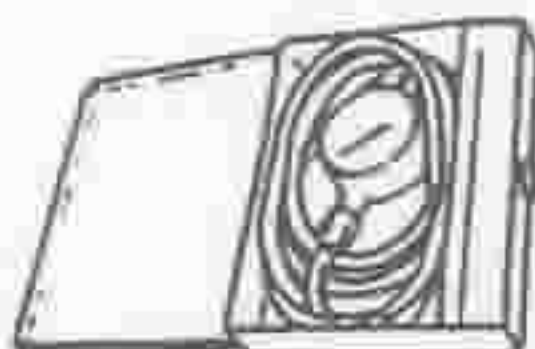
(3) Connect the connector of the oil pressure switch.

(4) Start the engine and check it for oil leakage. Repair the leaky point if oil leakage exists.

(5) Connect the four clips of the front grill to the radiator support.



SST

Shape	Part number and Part name	Purpose	Remarks
	09990-87702-000 Oil pressure gauge	Measurement of engine oil pressure	

LLU00046-00038

SERVICE SPECIFICATIONS

Oil capacity	Whole	2.6 dm ³ (2.6 liter)
	Full level	2.2 dm ³ (2.2 liter)
	Low level	1.4 dm ³ (1.4 liter)
	Oil filter replacement and oil change	2.3 dm ³ (2.3 liter)
Oil pressure	At 1000 rpm	13.7 - 24.5 kPa (1.4 - 2.5 kgf/cm ²)
	At 3000 rpm	45.1 - 53.0 kPa (4.6 - 5.4 kgf/cm ²)

LLU00047-00000

TIGHTENING TORQUE FOR MAIN COMPONENTS

NOTE:

- As regards the tightening torques for the general bolts, refer to the section under "TIGHTENING TORQUES FOR MAIN COMPONENTS" in the EM section.

LUBRICATION SYSTEM

Tightening components	Tightening torques			Remarks
	N·m	kgf·m	ft·lb	
Oil pressure switch	13.7 ± 3.9	1.40 ± 0.40	10.1 ± 2.9	
Oil filter	9.8 ± 2.0	1.00 ± 0.20	7.2 ± 1.5	
Oil drain plug	24.5 ± 4.9	2.50 ± 0.50	18.1 ± 3.6	

LLU00048-00000